

**THE FEDERAL GOVERNMENT'S ROLE IN WILDFIRE
MANAGEMENT, THE IMPACT OF FIRES ON
COMMUNITIES, AND POTENTIAL IMPROVE-
MENTS TO BE MADE IN FIRE OPERATIONS**

**HEARING
BEFORE THE
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE**

ONE HUNDRED FOURTEENTH CONGRESS

FIRST SESSION

MAY 5, 2015



Printed for the use of the
Committee on Energy and Natural Resources

Available via the World Wide Web: <http://fdsys.gov>

U.S. GOVERNMENT PUBLISHING OFFICE

WASHINGTON : 2016

95-275

For sale by the Superintendent of Documents, U.S. Government Publishing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512-1800; DC area (202) 512-1800
Fax: (202) 512-2104 Mail: Stop IDCC, Washington, DC 20402-0001

COMMITTEE ON ENERGY AND NATURAL RESOURCES

LISA MURKOWSKI, Alaska, *Chairman*

JOHN BARRASSO, Wyoming	MARIA CANTWELL, Washington
JAMES E. RISCH, Idaho	RON WYDEN, Oregon
MIKE LEE, Utah	BERNARD SANDERS, Vermont
JEFF FLAKE, Arizona	DEBBIE STABENOW, Michigan
STEVE DAINES, Montana	AL FRANKEN, Minnesota
BILL CASSIDY, Louisiana	JOE MANCHIN III, West Virginia
CORY GARDNER, Colorado	MARTIN HEINRICH, New Mexico
ROB PORTMAN, Ohio	MAZIE HIRONO, Hawaii
JOHN HOEVEN, North Dakota	ANGUS S. KING, JR., Maine
LAMAR ALEXANDER, Tennessee	ELIZABETH WARREN, Massachusetts
SHELLEY MOORE CAPITO, West Virginia	

KAREN K. BILLUPS, *Staff Director*

PATRICK J. MCCORMICK III, *Chief Counsel*

LUCY MURFITT, *Senior Counsel and Natural Resources Policy Director*

ANGELA BECKER-DIPPMANN, *Democratic Staff Director*

SAM E. FOWLER, *Democratic Chief Counsel*

BRYAN PETIT, *Democratic Senior Professional Staff Member*

CONTENTS

OPENING STATEMENTS

	Page
Murkowski, Hon. Lisa, Chairman, and a U.S. Senator from Alaska	1
Cantwell, Hon. Maria, Ranking Member, and a U.S. Senator from Washington	2

WITNESSES

Tidwell, Thomas, Chief, U.S. Forest Service, U.S. Department of Agriculture ..	15
Pyne, Dr. Stephen, Regents' Professor, Distinguished Sustainability Scholar, School of Life Sciences, Arizona State University	23
Hood, Dr. Sharon, Post-Doctoral Researcher, College of Forestry and Conservation, University of Montana	28
Eisele, Robert, Watershed and Fire Analyst, County of San Diego, California (Retired)	38
Hallin, Bruce, Director, Water Rights and Contracts, Salt River Project	53

ALPHABETICAL LISTING AND APPENDIX MATERIAL SUBMITTED

Association of Fish and Wildlife Agencies	
Letter for the Record	125
Cantwell, Hon. Maria	
Opening Statement	2
Calkin <i>et al</i> , Forest Ecosystems 2015 Review	4
Caplin, Michael	
Letter for the Record	127
Eisele, Robert	
Opening Statement	38
Written Testimony	40
Responses to Questions for the Record	119
Hallin, Bruce	
Opening Statement	53
Written Testimony	55
Responses to Questions for the Record	123
Hood, Dr. Sharon	
Opening Statement	28
Written Testimony	30
Responses to Questions for the Record	115
Murkowski, Hon. Lisa	
Opening Statement	1
Partner Caucus on Fire Suppression Funding Solutions	
Letter for the Record	185
Placer County Water Agency	
Statement for the Record	190
Pyne, Dr. Stephen	
Opening Statement	23
Written Testimony	25
Responses to Questions for the Record	108
Tidwell, Thomas	
Opening Statement	15
Written Testimony	17
Responses to Questions from Senator Risch	
Chart entitled "U.S. Forest Service Regions 1 and 4: Projects in Designated Insect and Disease Areas in Idaho thru FY 2019/20"	79

IV

	Page
Tidwell, Thomas—Continued	
Chart entitled “Projects in Idaho Occurring within Section 602 Designated Landscapes FY 2015–2019”	82
Responses to Questions for the Record	94

THE FEDERAL GOVERNMENT'S ROLE IN WILDFIRE MANAGEMENT, THE IMPACT OF FIRES ON COMMUNITIES, AND POTENTIAL IMPROVEMENTS TO BE MADE IN FIRE OP- ERATIONS

TUESDAY, MAY 5, 2015

U.S. SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
Washington, DC.

The Committee met, pursuant to notice, at 10:07 a.m. in Room SD-366, Dirksen Senate Office Building, Hon. Lisa Murkowski, Chairman of the Committee, presiding.

OPENING STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

The CHAIRMAN. Good morning. We will call to order the Energy Committee hearing this morning. Welcome everyone.

We are discussing logistics here because we theoretically have a vote at 10:15. It is my intention to offer my opening statement and then turn to the Ranking Member for hers. If in fact they have called a vote at that point in time, I think what we will do is just take a quick break and go vote, so we can come back and hear the testimony from our witnesses this morning.

Obviously this is a very important issue to all of us around the country. We are here to examine our wildfire management policies including the impacts of wildfire on communities and our current fire operations. Unfortunately today may be a day where we struggle to find a whole lot that is positive about all of this.

Over the last 50 years we have seen a rapid escalation in the size, frequency and severity of wildfires. The most often cited causes are severe drought, a changing climate, hazardous fuel buildup due in part to decades of fire exclusion, insect and disease infestation and an explosion of non-native invasive species.

These are big problems. They are daunting problems, and they are problems that are not easily going away.

We have already seen the consequences unfold firsthand in my home state of Alaska. Last May we had the Funny River Fire just about this time actually, mid-May. It burned through the Kenai National Wildlife Refuge and spread smoke as far away as Fairbanks, more than 500 miles away.

The fire burned nearly 200,000 acres, or 300 square miles, before it was finally extinguished. It was the second largest ever recorded on the Kenai Peninsula. It threatened Kasilof, Sterling and lower

Skilak Lake forcing residents of those communities to evacuate. We are all thankful that there were no apparent fatalities.

The Funny River Fire was likely started by human activity, but the area has also changed dramatically in the last 20 years due in part to mass spruce bark beetle kill. Grasses have replaced forests and those grasses are simply more susceptible to fire. More than half of the peninsula's total forested land, nearly a million acres, has been lost which is, of course, a worrisome sign for the future.

Already this year the concern back home is that we will have an aggressive fire season. We have very low snowfall throughout the state, and it is dry. I was in Fairbanks this weekend, and I cannot recall a time on the first of May when not only the rivers are out but there is no snow pack anywhere.

The same factors that we are seeing up north and in the peninsula that are increasing the size, frequency and severity of wildfires are also driving up wildfire suppression costs both in actual dollars and as a portion of the total budget of the Forest Service. Beyond that the expansion of the Wildland Urban Interface, the WUI, and fire operation strategies and tactics cannot be overlooked. According to a recent USDA Inspector General report, 50 to 95 percent of Forest Service suppression costs were attributable to the defense of private property, much of which is located in the Wildland Urban Interface.

It is looking more and more like the Forest Service is morphing into an emergency fire service that throws everything that it has at every wildfire whether effective or not. Last year was a good example. The Forest Service spent \$200 million more on suppression than it spent on average over the last ten years despite there being less than half the number of fires, less than half the number of acres burned and less than half the number of homes burned.

We need to see a paradigm shift from fire control at all costs to actual fire management. It is my hope that we can implement a wildfire policy that responsibly funds wildfire suppression needs, ends the unsustainable practice of fire borrowing, helps Fire Wise our communities and makes the necessary investments in a full suite of fuel treatments.

These will be my policy goals here in the Committee. It will not be easy to achieve them, but if we do I think we create fire resilient landscapes in which wildfires can occur without such devastating consequences for our lands, our communities and for our budgets.

I look forward to the testimony of our witnesses here this morning. Thank you all.

Senator Cantwell, we will now turn to you for your comments.

STATEMENT OF HON. MARIA CANTWELL, U.S. SENATOR FROM WASHINGTON

Senator CANTWELL. Thank you, Madam Chair, and thanks for calling this important hearing. I, too, want to thank the witnesses for joining us today.

The fire season is upon us, and we are looking to you as experts to tell us how we can better prepare for this year's fire season.

For some time now the Committee has heard time and again that our fires are getting noticeably worse. The extreme weather conditions, the amount of hazardous fuel in our forests, suboptimal

management schemes and an increasing inter urban wildland interface, as the Chair was saying, are combining to produce more lethal fires. So the people in my state are all too familiar with this and want to know what we can do to better prepare.

Throughout the country we saw fires, but, I think, the State of Washington was probably the most hard hit. I see Chief Tidwell nodding his head. We had more than twice the average in number of acres burned across the northwest. Last July Washington suffered the Carlton Complex Fire. We spent a lot of time talking to people in the community. This fire alone burned 149,000 acres in a single day. It burned an average of five acres per second for 24 hours straight. So with the combination of extreme weather and this fire, over 353 homes were lost.

Despite many efforts for people to coordinate resources, the people in those towns lacked the power of communication for weeks. Because of downed telephone lines, homeowners were not able to call to warn about the continued encroaching fires. Instead police had to drive around from town to town calling for evacuation from their vehicles using a megaphone.

One thing that I will be calling for is better coordination between the Forest Service and FEMA on communication responses during these natural disasters. If they are becoming worse, we need better memorandums of understanding that require communications be set up right away so that our communities can continue to deal with these disasters.

I know that we can get ahead of these issues, and as the Chair mentioned, we need more hazardous fuel reduction in the wildland urban interface. We need to figure out how to use resulting biomass to offset these costs. I know we are going to hear testimony about that today, and I look forward to it.

I am also eager to hear from the witnesses on more prescribed fire burns. Also we need to address fresh ideas on how to fund Forest Service efforts to protect our communities. Senator Wyden, as we know, has introduced legislation on this. I am happy to be a co-sponsor, and I look forward to discussing that.

The science is clearly telling us that wildfires are not behaving the same way they have in the past decades. The witnesses will talk more about why this is, but I want to make sure that we discuss today what our response is going to be to this evolving problem.

Researchers from the Forest Service, just last week, published a major scientific report. The report made it clear that if we were ever going to get ahead of the problem, the Forest Service needs to respond to wildfires in a fundamentally different way.

[The information referred to follows:]

REVIEW

Open Access

Negative consequences of positive feedbacks in US wildfire management

David E Calkin^{1*}, Matthew P Thompson¹ and Mark A Finney²

Abstract

Over the last two decades wildfire activity, damage, and management cost within the US have increased substantially. These increases have been associated with a number of factors including climate change and fuel accumulation due to a century of active fire suppression. The increased fire activity has occurred during a time of significant ex-urban development of the Wildland Urban Interface (WUI) along with increased demand on water resources originating on forested landscapes. These increased demands have put substantial pressure on federal agencies charged with wildfire management to continue and expand the century old policy of aggressive wildfire suppression. However, aggressive wildfire suppression is one of the major factors that drive the increased extent, intensity, and damage associated with the small number of large wildfires that are unable to be suppressed. In this paper we discuss the positive feedback loops that lead to demands for increasing suppression response while simultaneously increasing wildfire risk in the future. Despite a wealth of scientific research that demonstrates the limitations of the current management paradigm pressure to maintain the existing system are well entrenched and driven by the existing social systems that have evolved under our current management practice. Interestingly, US federal wildland fire policy provides considerable discretion for managers to pursue a range of management objectives; however, societal expectations and existing management incentive structures result in policy implementation that is straining the resilience of fire adapted ecosystems and the communities that reside in and adjacent to them.

Keywords: Wildfire suppression; Wildfire paradox; Wildland urban interface; Resilience

Review

In the past half century, wildland fire managers in the US has developed an increasingly sophisticated suppression response organization, including large aircraft, smoke jumpers, infrared mapping, satellite detection, computer dispatching, fire simulation, and nationwide coordination. Between 2011 and 2014, federal expenditures on suppressing large wildfires have exceeded \$1.5 each year (National Interagency Fire Center 2014), but wildfires are becoming larger and more expensive and damages to watersheds and communities are still rising. Do these outcomes evince success of a suppression-centric strategy? Are practical alternatives available? In this article we review the structure of US wildfire management organizations. Attention is given to the incentives for agencies as well as the public. Evaluation of incentives and consequences within the framework of

actuarial risk assessment reveals that modern wildfire problems derive from the self-reinforcing cycle of counter-effective actions.

Historical context

Wildfire has been long recognized as an essential and perpetuating process in the ecology of most North American forests and rangelands (Wright 1982). In some places today, such as the southern states fire has an accepted presence and is seen as a vital management tool (Fowler and Konopik 2007). By contrast, the western US contributes most of the suppression costs and damages and policies emphasizing fire exclusion have come to be regarded as both feasible and desirable. The evolution of current policy is well documented by historians (see for example Pyne 1982). Consequences of fire exclusion can be generalized from detailed ecological research that shows low and mid-elevation forests with relatively frequent fires have become denser and spatially continuous and support large crown fires (Hessburg et al. 2005).

* Correspondence: decalkin@fs.fed.us

¹Forestry Sciences Laboratory, US Forest Service Rocky Mountain Research Station, 800 East Beckwith, Missoula, MT 59801, USA
 Full list of author information is available at the end of the article



Springer

© 2015 Calkin et al.; licensee BioMed Central. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited.

Forests with long-interval fire regimes show changes in landscape patterns and proportions of age and structure (Keane et al. 2002). Grassland and shrubland ecosystems have also experienced changes in fire regime in the past century, with some losing diversity without fire (Brockway et al. 2002) and some because of increased fire frequency after invasion by exotic annual grasses that increase continuity and flammability under a wide range of weather conditions (Knapp 1996).

Perhaps the strongest evidence of changes to fire regimes in forested ecosystems caused by attempted fire exclusion comes from comparisons between contemporary management and direct accounts of management at the close of the 19th century. The series of Annual Reports to the Department of Interior regarding the forest reserves from 1897–1905 offers a broad set of descriptions of forests and fire activities throughout the west and depicts startling contrasts with contemporary conditions. In California, for example, the 257,314 acre Rim Fire in 2013 (Lydersen et al. 2014) and the 97,717 acre King fire in 2014 burned as extensive crown fires through multiple elevation zones in the west-central portion of the Sierra Nevada mountains. Little more than a century before, however, Sudworth (1900) described a universal surface fire regime in forests of the Stanislaus and Tahoe Forest Reserves:

"The fires of the present time are peculiarly of a surface nature, and with rare exception there is no reason to believe that any other type of fire has occurred here. Parts of the older forests may have had a deep humus, which, being burned, would have destroyed timber by deep burning at the roots. But there being no humus at the present time, deep burning is impossible. The tree roots are for the most part buried deep in the crevices of bare rock, in gravel, sand, or shale, over which surface fires run annually without the slightest direct injury to the roots. Barring the debris left from timbercutting, the only food for these fires is the scanty fall of pine and fir needles, irregular patches of low conifer seedlings, and chaparral. In general, these materials limit the fires to surface burning" (Sudworth 1900).

The wholesale conversion of California forests from a surface fire regime to the modern infrequent crown fire (Show and Kotok 1924) occurred rapidly because fires were easily suppressed in those early fuel conditions and the high productivity of the California environment generated biomass quickly. The same trends are documented in low- and mid-elevation forests throughout the west (Keane et al. 2002; Hessburg et al. 2005; Pechony and Shindall 2010) but more slowly where productivity is lower (e.g. Colorado). In California, both factors encouraged foresters to think that

fire could be excluded to grow more trees. Several decades later, Show and Kotok (1924) recorded effects of pursuing total fire exclusion:

"The establishment of the national forests in California, beginning as early as 1891, thus found forest burning an established practice. The idea that fires could be excluded entirely from millions of acres was generally regarded as preposterous and the most gloomy pictures were drawn of any such attempt. It was claimed that the uncontrollable crown fire was to be expected as the inevitable consequence of allowing ground cover and litter to accumulate. Thus, in the early years of protection of the national forests, the forests were still open as a result of the repeated fires of the past. The great outbreak of incendiarism and agitation for light burning did not come until later. As fire protection became an accomplished fact and the young growth began to fill up the open forest, the amount of inflammable material in the forests increased greatly."

Even with the advantage of witnessing firsthand the fuel and fire transformations, advocates for prescribed fire ("light burning") in the early 1900s had political difficulties reversing the trend because of the primacy of timber-management perspectives. Show and Kotok (1924) detail considerable evidence against early attempts to reintroduce frequent surface burning resulting in damage to timber and killing of tree reproduction. Nowadays, forest scientists and ecologists find these historical reports convincing evidence that attempted "protection" paradoxically caused forest destruction. Protection really was not "an accomplished fact" because wildfire could not be permanently deferred – only changed in character when it inevitably occurred. However, the existing incentives and organizational structure maintain this pattern of wildfire suppression response.

Modern context

Increasing wildfire activity, damage, and associated management cost within the US (Williams 2013) is driven by a complex web of social and ecological factors (Spies et al. 2014). Although disturbance is a critical characteristic of many ecological systems that have evolved with wildfire and human communities over the past several millennia (Stewart 2002), fire control remains the dominant management paradigm in the western US beginning in the 20th century (Pyne 1982). Now, after more than a century of aggressive suppression the wildfire paradox (Arno and Brown 1991) is fully realized in most western forests. Reduced wildfire on the landscape has led to increased fuel loading and continuity on most forested landscapes in the western US. Under extreme but not infrequent conditions suppression is less successful particularly where fuels have

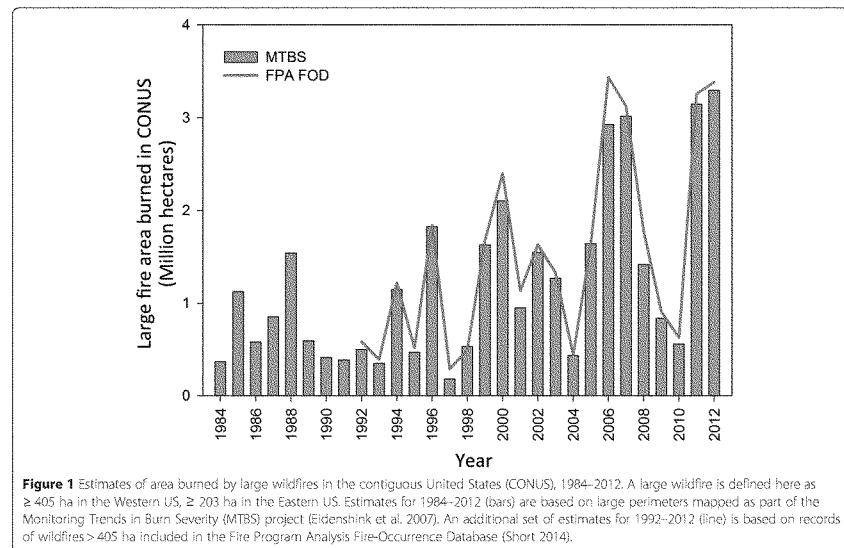
accumulated (Arno and Brown 1991; Stephens and Ruth 2005) and impacts to natural and developed resources are greater. Essentially, through our management efforts we have changed the distribution of fire behavior to only the most extreme. Public land management agencies have responded to this increase in wildfire activity with increased effort to remove wildfire from the landscape through aggressive initial attack (IA) and extensive wildfire suppression efforts aimed at minimizing the size of and/or damage from those few fires that escape IA. Although IA rates appear to be relatively stable (averaging between 97 and 99 percent successful, Calkin et al. 2005), the amount of area burned from large fires has been increasing over the last several decades (see Figure 1) further prompting increased wildfire suppression effort.

A report by USDA Forest Service (2014) documents the financial scale of wildfire management activities including large fire suppression and associated consequences to the Agency's budget. Large wildfire suppression activities by US Federal agencies have cost nearly \$24 billion between 2000 and 2013 (adjusted to 2013 US\$). This does not include state and local government costs nor does it include federal cost for pre-suppression activities (planning, equipment and labor acquisition), wildfire initial attack, or hazardous fuels management. The USDA Forest Service maintains the largest federal wildfire organization representing approximately 70 percent of all federal expenditures on wildfire

management. In 1995 wildfire related expenses represented 17 percent of the US Forest Service's appropriated funds, by 2014, 51 percent of the appropriated funds were related to wildfire management. This increased demand for wildfire suppression has created a budgetary cycle where ever increasing demands for wildfire suppression funding come at the cost of other public land management programs, some of which are intended to directly reduce future wildfire damage. During this period of time, the Agency's budget has not increased commensurately with the rise in wildfire management expenditures. Thus other major budget items have experienced significant reduction; for example vegetation and watershed management (22 percent reduction), facilities (67 percent reduction), roads (46 percent reduction), and deferred maintenance (95 percent reduction) (USDA Forest Service 2014). Increasing wildfire damage to human and ecological systems compromise public land management agencies such as the USDA Forest Service's ability to maintain key ecological function and the provisioning of ecosystem services.

Drivers of wildfire response

Although a number of recent articles have focused on the application of active forest management of fire adapted ecosystems to improve social and ecological conditions (see for example Franklin et al. 2014; Spies et al. 2014) we examine the drivers of wildfire management response and

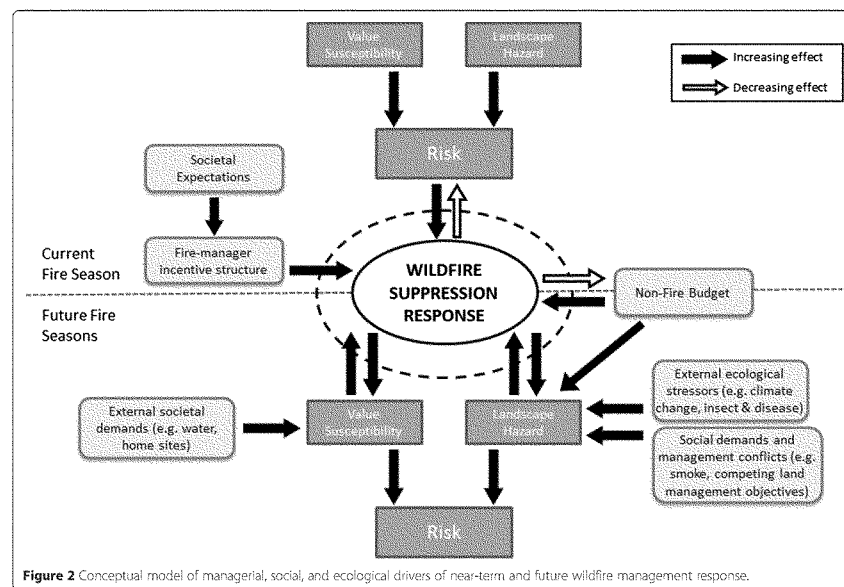


implications to the implementation of wildfire policy and associated consequences. Figure 2 demonstrates primary managerial, social, and ecological drivers of wildfire management response in both the fire season that is currently being managed and how these factors affect the trajectory of wildfire risk and associated management response into the future. In this simplified framework, wildfire risk is jointly determined by the landscape hazard and the susceptibility of values-at-risk (Finney 2005). Hazard reflects forest and fuel conditions, and is typically quantified in terms of the likelihood and intensity of wildfire (Scott et al. 2013). The susceptibility of resources (e.g., habitat) and assets (e.g., homes) is often framed as potential loss, however for some resources fire can lead to improved ecological condition (Scott et al. 2014). The critical point of this figure is that all of the primary drivers of wildfire suppression response, both within the current season and the trajectory for future response, drive an increasing suppression response with consequences to the trajectory of future wildfire risk and associated loss.

Wildfire risk drives managers to attempt to suppress wildfires to reduce potential resource loss from the current event. Economic efficiency suggests that the cost of the last resource assigned to manage a wildfire should be equal to the reduction in net loss from the assignment of that

resource. Although US federal wildland fire policy does not specifically direct managers to seek economically efficient strategies it does dictate that the cost of the management response should be commensurate with values to be protected (Interagency Working Group 2001). Despite guidance on the application of economic principles to wildfire management there are many reasons to believe that current suppression response is excessively risk averse. Specifically, the loss of value to resources due to wildfire may be less than the cost of the suppression response developed to protect those values. In a choice survey of federal wildfire managers Calkin et al. (2013) demonstrated that, all else equal, managers were more likely to select wildfire suppression strategies with higher suppression costs after accounting for potential risk to homes, ecological values, and firefighter exposure.

Wildfire management response that promotes increased application of wildfire may be hindered by societal expectations of the suppression only orientation of past management practices (Steelman and McCaffrey 2013). Socio-political influence from politicians, landowners and the affected public on fire managers increases the level and cost of suppression response (Canton-Thompson et al. 2008). For example Donovan et al. (2011) demonstrated that per area cost of



managing a wildfire was positively associated with the seniority of the congressional representative of the district in which the fire occurred and the amount of media coverage. In addition to the positive socio-political influence on the level of suppression response, the existing incentive structure and budget process provides only weak feedback in terms of internalizing the impact of wildfire suppression spending on decision makers charged with managing wildland fires (Donovan and Brown 2005; Thompson et al. 2013).

Further, federal fire managers exhibit decision biases and heuristics that are common to environments characterized by significant complexity and uncertainty, which can lead to suboptimal decisions and outcomes (Thompson 2014). When selecting strategies, fire managers have displayed the discounting bias (overemphasizing short-term risk reduction over longer-term considerations), the status quo bias (reverting to suppressing all fires relative to allowing fires to burn for ecological considerations), and the loss aversion bias (preferring safe options when consequences are framed as potential gains) (Wilson et al. 2011). Fire managers can also exhibit systematic errors in estimating and interpreting probabilistic information (such as underestimating likely outcomes while overestimating rare events), which can lead to poor risk management (Donovan and Noordijk 2005; Maguire and Albright 2005; Wibbenmeyer et al. 2013). Knowledge gaps and limited understanding of the socioeconomic and ecological consequences of fire engender further uncertainty when evaluating alternative courses of action (Thompson and Calkin 2011; Venn and Calkin 2011; Hyde et al. 2013) which may lead to managers pursuing aggressive suppression strategies under conditions with low levels of risk to valued assets (Wibbenmeyer et al. 2013).

Budgetary implications of spending on wildfire suppression have both immediate and long term negative consequences. Over recent years, spending on current wildfire seasons have frequently resulted in transferring budget away from other land management activities including those that could reduce landscape hazard such as fuel reduction treatments. However, it has become increasingly clear that the impact of increasing fire management costs on non-fire related expenditures may have more significant long term implications to the agencies' ability to meet their land management objectives than issues associated with in season fund transfers (USDA Forest Service 2014). In 2014 there has been an active effort within the US Congress and Obama administration to fund a portion of wildfire management expenditures similar to current natural disaster funding under the Federal Emergency Management Agency. By funding wildfire suppression for large wildland fires under such an approach the uncertainty associated with changes in annual fire expenditures due to different levels of fire activity and the downward funding

trends on non-fire programs would be simultaneously addressed.

Under certain conditions wildland fire can promote significant ecological benefits and reduce the risk that high intensity fires will spread to areas of high value into the future (Noss et al. 2006). Although there is broad scientific consensus regarding the need for more fire on the landscape, almost all fire management entities within western states require and promote aggressive suppression of all wildfires. Within federal land management agencies knowledge and experience allowing wildfires to burn for beneficial effects has been growing over time and is established within the land management objectives of the different federal agencies. The published 2009 interpretation of US Federal Wildfire Policy (Fire Executive Council 2009) expanded the opportunity of managers to better consider beneficial aspects of wildfire when determining fire management strategies. However, achieving increased beneficial wildfire opportunities in practice has been far more challenging. Existing land and fire management plans have not sufficiently considered the role of existing beneficial use on future fire management opportunities (Doan et al. 2006; Calkin et al. 2011) and managers are subject to a status quo bias that makes them reluctant to select beneficial use strategies when full suppression has been previously established (Wilson et al. 2011). Despite increased scientific recognition of the need to allow wildfire in fire adapted ecosystems to burn for resource benefit and examples of successful wildland fire use programs suppression persists as the dominant fire management strategy.

Landscape hazard & value susceptibility

Concurrent with the increased wildfire activity has been a substantial increase in residential development within the Wildland Urban Interface (WUI) (Theobald and Romme 2007). Despite the vigorous fire suppression near human communities (Gebert et al. 2007; Liang et al. 2008; Gude et al. 2013) the number of homes destroyed by wildfire continues on an upward trend. Wildfire-related insured losses in the United States in the 10 year span of 2002 to 2011 totaled \$7.9 billion (US). This represents a \$6.2 billion increase over the previous decade (Haldane 2013). Although wildfire risk reduction near the WUI has been targeted by public land management agencies, failure to consider the conditions under which loss occurs may limit the effectiveness of these investments in reducing residential property loss (Calkin et al. 2014). Further, certain landscape conditions and fire regimes are more amenable to fuel treatments and community capacity and institutional factors have a strong influence on social acceptability (Spies et al. 2014) and capacity to act thus requiring context specific risk reduction strategies (Moritz et al. 2014).

A primary tool for land managers to address increasing landscape hazard is hazardous fuels reduction treatments. Within the federal fuel treatment programs a majority of

funding is directed towards treatments within the WUI. However, it has been well demonstrated that residential home destruction is primarily determined by the immediate surrounding (30–60 m) of the home, known as the home ignition zone (HIZ) (Cohen 2000, 2010). The HIZ principally determines home ignition potential during extreme wildland fire behavior and includes the home construction characteristics and its immediate surroundings, in most cases largely on private land. Focusing solely on wildland vegetation without consideration and mitigation of HIZs furthers the illusion of WUI protection without homeowner engagement. Prioritizing public investments on fuel reduction efforts and wildfire suppression in and around the WUI reduces the true cost of housing location decisions thus incentivizing development in high wildfire hazard areas and need for increased future investment (Cleatus and Mulik 2014). Significant progress has been made in the development of community based wildfire protection plans however, land use zoning restrictions and requirements to reduce structure ignitability remain contentious issues (Jakes et al. 2011).

Beyond the increasing risk to human development, the increasing population within the western US drives increased demand for municipal water. In the western US, half of all water originates on lands administered by the US Forest Service (Brown et al. 2008). Severe wildfires can result in significant and costly impacts to municipal watersheds, ranging from increased sedimentation to increased likelihood of debris flows to damage of water delivery infrastructure and interruption of service, prompting additional interest in risk mitigation options (Warziniack and Thompson 2013; Tillery et al. 2014).

Prescribed fire has been well recognized within the scientific literature (Hann and Bunnell 2001; Graham et al. 2004; Martinson and Omi 2013) as a fuel modification and restoration technique that is highly effective at mitigating wildfire behavior. Hann and Bunnell (2001) proposed that fire and land management planning focus fuel treatment efforts on reducing the current level of departure of forested lands from their historical fire regime to address increasing wildfire concerns within the United States. Although challenges emerged to define and manage towards departure many of the original concepts are present in the current emphasis on restoring the condition of dry frequent fire pine forests in the western US. There is general scientific agreement that fuel loading and stand density have reduced the resilience of these forests by making them more susceptible to wildfire and insect and disease outbreaks (Allen et al. 2002; Hessburg et al. 2005; Noss et al. 2006). In general society has a preference for active management to address wildfire risk and degrading ecological conditions of fire adapted forests (McCaffrey et al. 2012). However, societal factors such as inadequate funding, conflicts among objectives and priority of resource

values as well as limited public understanding have created significant delay in the implementation of these programs to restore forest resilience to fire (Franklin et al. 2014; Rideout et al. 2014). Additionally, the current scale of fuel treatment is far less than required to achieve landscape resilience (North et al. 2012). Along with societal barriers, conflicting priorities within land management plans and mandates within environmental regulations such as the Clean Air Act and the Endangered Species Act limit the ability to achieve substantial reduction of wildfire hazard (Calkin et al. 2011).

Future fires and maladaptation to risk

Pyne (2011) summarizes the condition of fire management in the US as follows: "What is striking about the American style of fire is how technically robust it is, and how politically dysfunctional and inept in practice so much of it has become." In the face of the increasing wildfire risk and highly damaging events, political responses have typically focused on increasing the suppression response (Busenberg 2004). Wildfire suppression without a commensurate program to address the fuel accumulation resulting from the aggressive suppression policy represents a major policy error in federal fire management (Busenberg 2004). This policy error was propagated with mounting impacts as federal land management agencies acquired new resources and influence to reinforce the established institutional wildfire management approach of aggressive suppression. This self-reinforcing action has caused the impacts of the original policy failure to gradually escalate over time. The self-reinforcing nature of aggressive suppression response is not unique to wildfire management in the US and has been demonstrated using a system dynamics modelling approach to wildfire management in Portugal (Collins et al. 2013). Further the authors identified three primary reasons why transformation of this self-reinforcing and costly behavior is unlikely to occur organically due to 1) managerial incentive structures focusing on short term results, 2) challenges to identifying when mitigation resulted in damages averted and the inability to take credit, and 3) the financial interests of established firefighting organization in maintaining current policy. Spies et al. (2014) argued that challenges such as heterogeneity in wildfire behavior and effects, human behavior and values and weak landscape feedbacks to humans create a highly complex system that may lead to maladaptive behavior and unintended consequences of fire policy.

State agencies charged with wildfire management typically have less flexibility in their suppression policy. With few exceptions most western state agencies are directed to suppress wildfires at the smallest size feasible. Further, as many of the states have experienced highly damaging events the typical response has been to increase the pre-established emphasis on aggressive suppression of all wildfires. For example, the state of Colorado experienced several highly

damaging wildfire events including the Fourmile Canyon Fire of 2011 (169 homes destroyed, zero fatalities), High Park Fire (259 homes destroyed, one fatality), Waldo Canyon Fire of 2012 (346 homes destroyed, zero fatalities), and the Black Forest Fire of 2013 (486 homes destroyed, two fatalities). Additionally, the Lower North Fork Fire in 2012, an escaped prescribed fire conducted by the Colorado State Forest Service, burned 23 homes and killed three people. In a response to this event responsibility for wildfire management was moved from the Colorado State Forest Service to the Department of Public Safety. Additionally, the state has implemented new restrictions and additional requirements for the application of prescribed burning and approved a bill to fund a fleet of state owned aerial wildfire suppression resources. The intent of the investment in aerial resources was stated as follows: "Keep all wildfires with values at risk smaller than 100 acres and to suppress all fires in Wildland Urban Interface (WUI) areas at less than ten acres, 98% of the time." (Colorado Department of Fire Prevention and Control 2014). This demonstrates an instance when a wildfire agency defines target conditions of preparedness and capability below the large fire-disaster levels. Highly damaging wildfires such as the Waldo Canyon, Fourmile, and Black Forest Fires occur during the 2 percent of events where suppression is not effective (Calkin et al. 2014).

Breaking the cycle

Policies and actions to reduce the cycle of ever increasing wildfire suppression effort, management costs, and resource losses will be challenging to implement. Inertia of the existing social systems habituated by the current management paradigm is entrenched in social expectations and agencies' cultures. Significantly reducing fuel loading associated with the current condition of the forested landscape through active management would require huge capital investment and conflict with other existing environment regulations. The 2009 Interpretation of Federal Wildfire Policy opened up opportunities to manage wildfires for resource benefit within the wildfire suppression program. However, in recent years managing fires by allowing them to burn under certain conditions to achieve resource benefit has proved challenging (Hubbard 2012).

Concepts of system resilience may provide an interesting lens to examine current challenges in wildfire management. Resilience thinking extends previous efforts for sustainable resource management such as ecosystem analysis and adaptive management by further emphasizing the critical linkages between social and ecological systems (Rist and Moen 2013). Resilience can be defined as "the capacity of a system to absorb disturbance, re-organize, and keep functioning in much the same way as before" (Walker 2013). Managing towards resilience can be characterized as actions that maintain a desirable state or transform existing structure to achieve a more desirable

state (Walker et al. 2006). Resilience by itself at one spatial and temporal scale does not imply that a system is in a beneficial state. Many types of ecological or social systems may be highly resilient, but result in reduced ecological condition or social wellbeing. For example cheat grass invaded ecosystems in the Western US are highly resilient to disturbance. Thus, resilience requires looking at systems at different scales – achieving resilience at one level may require transformation at other levels (Walker 2013). The current wildfire management policy in the US has slowly evolved over the last century but has been relatively consistent; aggressively suppress all wildland fires. Altering the trajectory of risk will require system transformation. There are several possible trajectories for the future of wildfire management. As describe earlier, maintaining the status-quo has obvious implications in terms of increasing wildfire risk, increased damage and loss due to wildfire, along with significant consequences to the structure and functioning of public land agencies and their ability to meet their core missions. Alternatively, wildfire management could be driven to transform by the public demanding an alternative wildfire management approach and/or by transformative actions initiated within federal agencies themselves.

Transformation is frequently initiated by a series of highly salient events that create a dramatic shift in public expectations and demands from existing social structures. The scale of event that would lead to US society demanding a transformation of current wildfire policy remains unknown. O'Neill and Handmer (2012) suggest that the Black Saturday events in Victoria and New South Wales Australi, where 172 civilians were killed represent such a transformative event. The significant media and public attention caused by the scale of loss of life resulted in a critical examination of bushfire management in general and more specifically the implication of the Stay and Defend Policy and prescribed fire program. Despite the increased political and media focus associated with the events of Black Saturday, there is some concern that homeowner response to wildfire may not have changed and that existing public behavior has not transformed in light of these events. Specifically, approximately one-third of respondents to a survey targeted at Australian households at risk from bushfire just one year after the Black Saturday fires was to wait and see what happens during the fire, but leave if threatened by the fire (Rhodes 2011). Essentially this represents a strategy of evacuating late which is in complete contrast to the stated policy in Australia. Thus, it is probably too early to determine if in fact the Black Saturday events result in a transformation of Australian fire management policy and implementation.

Systems can adaptively transform in ways that allow the system to better handle changing conditions, stress, hazards,

risk or opportunities in the future (see Smit and Wandel 2006). Such an adaptive transformation would require a range of alternative approaches to be pursued including increased levels and improved efficiency of fuel reduction treatments, alternative management structures that encourage less aggressive suppression strategies that incur broader ecological outcomes and reduce future wildfire hazard, improved risk sharing among public land managers and interface communities through more fire resistant structure design, modified fuel conditions adjacent to communities, and zoning restrictions of further development within the most fire prone areas (Cleatus and Mulik 2014).

If wildfire suppression funding was handled under a disaster relief funding mechanism, continued stress on fuel reduction funding and other active management that may reduce wildfire risk could be alleviated. However, unless the scale of fuels funding were dramatically increased along with relief from conflicting environmental regulations it is unlikely that the scale of fuel modification will be accelerated to reduce the wildfire hazard in the short term. Therefore, although it does not appear that fuels treatments activities could replace wildfire in achieving ecological resilience of forested ecosystems in the western US, they will likely play a critical role in positive adaptive management response. Recognizing this reality, Reinhardt et al. (2008) identified the importance of fuel treatment in creating landscapes where fire can occur without devastating consequences; recognizing that we cannot, nor should not expect fuel treatment programs to replace naturally occurring wildfire. Achieving this objective requires focusing treatments such that, in the event of a wildfire, spread and intensity is such that significant loss to highly valued resources is minimized.

Reduced fuel loading and improved forest health is a necessary but not sufficient condition for reducing wildfire risk. The range of ecosystem conditions, fire regimes and land uses suggests a one size fits all approach to wildfire and fuels management is neither desirable nor feasible (Keeley et al. 2009). In many communities fuels reduction activities may be quite challenging due to a range of factors such as rapid regrowth, high management cost, and complex ownership patterns. Further in some areas such as lodgepole pine forests in the interior west, the natural fire regime is infrequent high intensity fire and reasonable fuels reduction treatments are limited. Under these circumstances reducing the susceptibility of highly valued resources to wildfire may be more appropriate. As Dombeck et al. (2004) state, "communities need to shoulder greater responsibility for regulating sprawl and for encouraging proactive efforts by homeowners to reduce the risk of home ignition during wildfire."

Within the Southeastern US a culture of aggressive prescribed fire has developed gradually over the past 50 years with the reduction of fire hazard as the primary

management objective across ownerships (Fowler and Konopik 2007). By maintaining fuel conditions through regular burning and the development of a community of practitioners forest lands are generally maintained in a condition of relatively low hazard with management cost far less on a unit basis than equivalent treatments in the Western US. For example, National Forest land in the southeastern US (US Forest Service Region 8) represents only 10 percent of the total Forest Service land base, but between 2007 and 2012 the region accounted for almost 70 percent of the Agency's prescribed burned area while accounting for only 6 percent of large fire suppression costs (USDA Forest Service internal reports).

By allowing naturally ignited wildfires to burn to achieve resource benefit (formerly known as wildland fire use), fuel conditions may be improved thus reducing wildfire risk in adjacent areas. The reduced wildfire risk may further increase the area and weather conditions where wildfires need not be aggressively suppressed. In several wilderness areas throughout the Western US, such as the Selway-Bitterroot and Bob Marshall Wilderness Areas in Montana, and the Gila Wilderness in New Mexico, once reduced fuel loading and barriers to fire spread associated with past fire scars have been achieved, wildfire can play a role in maintaining these landscapes (Teske et al. 2012; Parks et al. 2014). Despite the critical role past fire scars have played in the suppression of large fires (Graham 2003; Cochrane et al. 2012), extensive application of the use of naturally ignited wildfires has not yet been well demonstrated outside large wilderness areas. Recognition that fire exclusion is neither desirable nor possible in many regions of the country is an essential (Moritz et al. 2014) and will be a critical component of any effort to transform wildfire management.

Conclusions

Examination of ecological and human community resilience in fire adapted ecosystems suggests a social ecological system that is under considerable stress. Increasing wildfire hazard due to fuel accumulation and climate related stressors and increasing vulnerability of developed residential communities and natural resource values suggest a future of increasing risk and management cost unless the current management paradigm is transformed. For transformation to succeed it will require increased recognition of the consequences associated with the current paradigm, social acceptance of alternative fire management strategies, and alteration of the culture of public agencies charged with wildfire suppression. Specifically actions include: 1) enhanced risk sharing among affected partners; 2) modification of managerial incentive structures and enhanced training; 3) land management treatments that directly address local risk factors and align with broad risk reduction

strategies; 4) reduction of the uncertainty around outcomes from less aggressive suppression response through improved decision support; and 5) enhanced consideration of long term impacts of current decisions (visioning).

Fortunately, just like the current wildfire suppression paradox, many of the necessary changes are themselves self-reinforcing. The self-reinforcing nature of the use of fire to achieve land management objectives has been well demonstrated on selected public lands (Parks et al. 2014) and the Southeastern US has effectively used prescribed burning to lower wildfire risk and mitigation costs.

A one size fits all approach to reducing wildfire risk does not exist. Each high risk landscape will require a suite of actions to modify the trajectory of increasing suppression demand and loss. For society to demand transformation of the current wildfire management paradigm some sort of tipping point event may need to occur. However, adaptive transformation where public agencies working alongside private citizens challenge the supremacy of the existing wildfire suppression model in favor of long term economically efficient risk mitigation strategies is possible.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

DC developed the conceptual model and drafted the manuscript. MT contributed content on risk assessment and decision science and manuscript editing. ME provided wildfire historical context and review of wildfire behavior along with manuscript editing. All authors read and approved the final manuscript.

Author details

¹Forestry Sciences Laboratory, US Forest Service Rocky Mountain Research Station, 800 East Beckwith, Missoula, MT 59801, USA. ²Fire Sciences Laboratory, US Forest Service Rocky Mountain Research Station, 5775 Highway 10 West, Missoula, MT 59808, USA.

Received: 31 October 2014 Accepted: 26 March 2015

Published online: 14 April 2015

References

- Allen CD, Savage AJ, Falk DA, Suckling KF, Swenham TW, Schulke T, Stacey PB, Morgan P, Hoffman M, Klingel JT (2002) Ecological restoration of southwestern ponderosa pine ecosystems: a broad perspective. *Ecol Appl* 12:1418–1433
- Amo SF, Brown JK (1991) Overcoming the paradox in managing wildland fire in western wildlands. University of Montana, Montana Forest and Conservation Experiment Station, Missoula, MT, pp 40–46
- Brockway DG, Gatewood RG, Paris RB (2002) Restoring fire as an ecological process in shortgrass prairie ecosystems: initial effects of prescribed burning during the dormant and growing seasons. *J Environ Manage* 65(2):135–152
- Brown TC, Hobbs MT, Ramirez JA (2008) Spatial distribution of water supply in the Coterminous United States. *J Am Water Resour As (JAWRA)* 44(6):1474–1487
- Busenberg G (2004) Wildfire management in the United States: the evolution of a policy failure. *Rev Policy Res* 21(2):145–156
- Calkin DE, Gebert KM, Jones JG, Neilson RP (2005) Forest Service large fire area burned and suppression expenditure trends, 1970–2002. *J For* 103(4):179–183
- Calkin D, Finney MA, Ager AA, Thompson MP, Gebert KG (2011) Progress towards and barriers to implementation of a risk framework for Federal wildland fire policy and decision making in the United States. *For Policy Econ* 13(5):378–389
- Calkin DE, Venn TJ, Wilbenmeyer MJ, Thompson MP (2013) Estimating US federal wildland fire managers' preferences toward competing strategic suppression objectives. *Int J Wildland Fire* 22(2):212–222
- Calkin DE, Cohen JD, Finney MA, Thompson MP (2014) How risk management can prevent future wildfire disasters. *Proc Natl Acad Sci* 111(2):746–751
- Canton-Thompson J, Gebert KM, Thompson B, Jones G, Calkin D (2008) External human factors in incident management team decisionmaking and their effect on large fire suppression expenditures. *J For* 106(8):416–424
- Cleetus R, Mulik K (2014) Playing with fire: how climate change and development patterns are contributing to the soaring costs of western wildfires. Available at: http://www.uscusa.org/assets/documents/global_warming/playing-with-fire-report.pdf. Accessed September 9, 2014
- Cochrane MA, Moran CJ, Wimberly MC, Baer AD, Finney MA, Beckendorf KL, Eldershink J, Zhu Z (2012) Estimation of wildfire size and risk changes due to fuels treatments. *Int J Wildland Fire* 21(4):357–367
- Cohen JD (2000) Preventing disaster, home ignitability in the wildland-urban interface. *J For* 98(3):15–21
- Cohen J (2010) The wildland-urban interface fire problem. *Fremontia* 38(2, 3):16–22
- Collins R, de Neufville R, Claro J, Oliveira T, Pacheco A (2013) Forest fire management to avoid unintended consequences: a case study of Portugal using system dynamics. *J Environ Manage* 130:1–9
- Colorado Department of Fire Prevention and Control (2014) Special report: Colorado Firefighting Air Corps. Available at: <http://dfs.state.co.us/>. Accessed October 30, 2014
- Doan D, O'Laughlin J, Morgan P, Miller C (2006) Barriers to wildland fire use: a preliminary problem analysis. *Int J Wilderness* 12:36–38
- Dornbeck MP, Williams JE, Wood CA (2004) Wildfire policy and public lands: Integrating scientific understanding with social concerns across landscapes. *Conserv Biol* 18(4):883–889
- Donovan GH, Brown TC (2005) An alternative incentive structure for wildfire management on national forest land. *For Sci* 51(5):387–395
- Donovan GH, Noordijk P (2005) Assessing the accuracy of wildland fire situation analysis (MESA) fire size and suppression cost estimates. *J For* 103(1):10–13
- Donovan GH, Prestemon JP, Gebert K (2011) The effect of newspaper coverage and political pressure on wildfire suppression costs. *Soc Nat Res* 248(8):785–798
- Eldershink J, Schwind B, Brewer K, Zhu Z, Quayle B, Howard S (2007) A project for monitoring trends in burn severity. *Fire Ecol (Special Issue)* 3:3–21
- Finney MA (2005) The challenge of quantitative risk assessment for wildland fire. *For Ecol Manage* 211:97–108
- Fire Executive Council (2009) Guidance for implementation of federal wildland fire management policy. http://www.nrlc.gov/policies/policies_documents/GFWMP.pdf. Last Accessed July 23, 2014
- Fowler C, Konepik E (2007) The history of fire in the southern United States. *Human Ecol Rev* 14(2):165–176
- Franklin JF, Hagmann RK, Urgenson LS (2014) Interactions between societal goals and restoration of dry forest landscapes in western North America. *Landscape Ecol*. DOI 10.1007/s10980-014-0077-0
- Gebert KM, Calkin DE, Yoder J (2007) Estimating suppression expenditures for individual large wildland fires. *West J Appl For* 22:188–196
- Graham RT (2003) Hayman Fire Case Study. Gen. Tech. Rep. RMRS-GTR-114. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, UT, pp 1–32
- Graham RT, McCaffrey S, Jain TB (2004) Science basis for changing forest structure to modify wildfire behavior and severity. USDA For. Serv. General Technical Report RMRS-GTR120
- Gude PH, Jones K, Rasker R, Greenwood MC (2013) Evidence for the effect of homes on wildfire suppression costs. *Int J Wildland Fire* 22(4):537–548
- Haldane M (2013) Insurers, government grapple with costs of growth in wildland urban interface. *Insurance J*. Available at: www.insurancejournal.com/news-national/2013/08/15/301833.htm. Accessed September 9, 2014
- Hann WJ, Bunnell DL (2001) Fire and land management planning and implementation across multiple scales. *Int J Wildland Fire* 10(4):389–403
- Hessburg PF, Agee JK, Franklin JF (2005) Dry forests and wildland fires of the inland Northwest USA: contrasting the landscape ecology of the pre-settlement and modern eras. *For Ecol Manage* 211:117–139
- Hubbard J (2012) 2012 Wildfire Guidance. Available at: <https://www.documentscloud.org/documents/407523-2012-wildfire-guidance-memo-may-25.html>. Accessed April 13, 2015
- Hyde KD, Dickinson MB, Bohrer G, Calkin DE, Evers L, Gilbertson-Day J, Nicolet T, Tague C (2013) Research and development supporting fire effects prediction

- for fire and fuels management: status and needs. *Int J Wildland Fire* 22(1):37–50.
- Interagency Working Group (2001) Review and update of the 1995 federal wildland fire management policy. National Interagency Fire Center, Boise, ID.
- Jakes PJ, Nelson KC, Engler SA, Burns S, Cheng AS, Sturtevant V, Williams DR, Bujak A, Brummel RF, Grayzeck-Souter S, Staychock E (2011) Community wildfire protection planning: Is the Healthy Forests Restoration Act's vagueness genius? *Int J Wildland Fire* 20(3):350–363.
- Keane RE, Ryan KCVTT, Allen CD, Logan J, Hawkes B (2002) Cascading effects of fire exclusion in the Rocky Mountain ecosystems: a literature review. Gen. Tech. Rep. RMRS-GTR-91. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO, p 24.
- Keeley JE, Aplet GH, Christensen NL, Conrad SG, Johnson EA, Omi PN, Peterson DL, Sweetnam TW (2009) Ecological Foundations for Fire Management in North American Forest and Shrubland Ecosystems. USDA For. Serv. General Technical Report: PNW-GTR-779.
- Knapp PA (1996) Cheatgrass (*Bromus tectorum* L.) dominance in the Great Basin Desert: history, persistence, and influences to human activities. *Global Environ Chang* 6(1):37–52.
- Liang J, Calkin DE, Gebert KM, Venn TJ, Silverstein RP (2008) Factors influencing large wildland fire suppression expenditures. *Int J Wildland Fire* 17:650–659.
- Lydersen JM, North MP, Collins BM (2014) Severity of an uncharacteristically large wildfire, the Elm Fire, in forests with relatively restored frequent fire regimes. *Forest Ecol Manag* 328:326–334.
- Maguire LA, Albright EA (2005) Can behavioral decision theory explain risk-averse fire management decisions? *For Ecol Manag* 211(1):47–58.
- Martinson EJ, Omi PN (2013) Fuel treatments and fire severity: a meta-analysis. USDA For Serv Research Paper RMRS-RP103www.
- McCaffrey S, Toman E, Sidham M, Shindler B (2012) Social science research related to wildfire management: an overview of recent findings and future research needs. *Int J Wildland Fire* 23:567–576.
- Mortiz MA, Balloir E, Bradstock RA, Gill MA, Handmer J, Hessburg PF, Leonard J, McCaffrey S, Odon DC, Schoennagel T, Syphard AD (2014) Learning to coexist with wildfire. *Nature* 515(7525):58–66.
- National Interagency Fire Center (2014) Available at: https://www.nifc.gov/fireinfo/fireinfo_documents/SuppCosts.pdf. Accessed February 23, 2015.
- North MP, Collins BM, Stephens SL (2012) Using fire to increase the scale, benefits, and future maintenance of fuels treatments. *J For* 110(7):392–401.
- Noss RF, Boer P, Covington WW, Grumbine RE, Lindenmayer DB, Prather JW, Schmiegslow F, Sisk TD, Vosick DJ (2006) Recommendations for integrating restoration ecology and conservation biology in ponderosa pine forests of the Southwestern United States. *Restor Ecol* 14(1):4–10.
- O'Neill SJ, Handmer J (2012) Responding to bushfire risk: the need for transformative adaptation. *Environ Res Lett* 7:014–018.
- Parks SA, Miller C, Nelson CR, Holden ZA (2014) Previous fires moderate burn severity of subsequent wildland fires in two large western US wilderness areas. *Ecosystems*. doi: 10.1007/s10021-013-9704-x.
- Pechony O, Shindler DT (2010) Driving forces of global wildfires over the past millennium and the forthcoming century. *P Natl Acad Sci* 107(45):19167–19170.
- Pyne SJ (1982) Fire in America: A cultural history of wildland and rural fire. Princeton University Press, Princeton, NJ, USA.
- Pyne S (2011) The willow fire: a ruinous burn. *Wildfire Magazine* 2011:14–17.
- Reinhardt ED, Keane RE, Calkin DE, Cohen JD (2008) Objectives and considerations for wildland fuel treatment in the Interior Western United States. *For Ecol Manag* 256:1997–2006.
- Rhodes A (2011) Opinion: ready or not? Can community education increase household preparedness for bushfire? *Aust J Emerg Manag* 26:6–10.
- Rideout DB, Ziesler PS, Kemohan NJ (2014) Valuing fire planning alternatives in forest restoration: Using derived demand to integrate economics with ecological restoration. *J Environ Manag* 141:190–200.
- Rist L, Moen J (2013) Sustainability in forest management and a new role for resilience thinking. *For Ecol Manag* 310:416–427.
- Scott JH, Thompson MP, Calkin DE (2013) A wildfire risk assessment framework for land and resource management. Gen. Tech. Rep. RMRS-GTR-315. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO, USA, p 83.
- Scott JH, Helmreich DJ, Thompson MP (2014 [In Press]) Assessing the expected effects of wildfire on vegetation condition on the Bridger-Teton National Forest, Wyoming, USA. Research Note RMRS-RN-XX. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Short KC (2014) A spatial database of wildfires in the United States, 1992–2011. *Earth Syst Sci Data* 6:1–27.
- Show SB, Kostok EJ (1924) The role of fire in the California pine forests. *Bulletin*, 1294 U.S. Department of Agriculture, Washington, D.C., p 80.
- Smit B, Wandel J (2006) Adaptation, adaptive capacity and vulnerability. *Global Environ Chang* 16(3):282–292.
- Spies TA, White EM, Kline JD, Fisher AP, Ager A, Bailey J, Bolte J, Koch J, Platt E, Olsen CS, Jacobs D, Shindler B, Steen-Adams MM, Hammer R (2014) Examining fire-prone forest landscapes as coupled human and natural systems. *Ecol Soc* 19(3):9. <http://dx.doi.org/10.5751/ES-06584-190309>.
- Steeleman TA, McCaffrey S (2013) Best practices in risk and crisis communication: Implications for natural hazards management. *Nat Hazards* 65(1):683–705.
- Stephens SL, Ruth LW (2005) Federal forest fire policy in the United States. *Ecol Appl* 15(2):532–542.
- Stewart OC (2002) Forgotten fires: native Americans and the transient wilderness. Univ Oklahoma Press, Norman.
- Sudworth GB (1900) The Stanislaus and Tahoe Forest Reserves and adjacent territory. pp 499–561. In: Twenty First Annual report of the United States Geological Survey to the Secretary of the Interior 1899–1900. Charles D. Walcott, Director. Part V: Forest Reserves. Washington DC, USA.
- Teske CC, Seielstad CA, Queen LP (2012) Characterizing fire-on-fire interactions in three large wilderness areas. *Fire Ecol* 8(2):82–106.
- Theobald DM, Romme WH (2007) Expansion of the US wildland urban interface. *Landscape Urban Plan* 83(4):340–354.
- Thompson MP (2014) Social, institutional, and psychological factors affecting wildfire incident decision making. *Soc Nat Res* 27(6):636–644.
- Thompson MP, Calkin DE (2011) Uncertainty and risk in wildland fire management: a review. *J Environ Manag* 92:1895–1909.
- Thompson MP, Calkin DE, Finney MA, Gebert KM, Hand MS (2013) A risk-based approach to wildland fire budgetary planning. *For Sci* 59(1):63–77.
- Tillery AC, Haas JR, Miller LW, Scott JH, Thompson MP (2014) Potential postwildfire debris-flow hazards—A prewildfire evaluation for the Sandia and Manzano Mountains and surrounding areas, Central New Mexico. U.S. Geological Survey Scientific Investigations Report 2014–5161, p 24, with appendix. <http://dx.doi.org/10.3133/sir20145161>.
- USDA Forest Service (2014) The rising cost of fire operations: effects on the forest service's non-fire work. Available at: <http://www.fs.fed.us/sites/default/files/media/2014/34/nr-firecostimpact-082014.pdf>. Accessed October 30, 2014.
- Venn TJ, Calkin DE (2011) Accommodating non-market values in evaluation of wildfire management in the United States: challenges and opportunities. *Int J Wildland Fire* 20(3):327–339.
- Walker B (2013) What is Resilience? Project Syndicate, <http://www.project-syndicate.org/commentary/what-is-resilience-by-brian-walker>.
- Walker BH, Gunderson LH, Kinzig AP, Folke C, Carpenter SR, Schultz L (2006) A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecol Soc* 11(1):13.
- Warzinek T, Thompson M (2013) Wildfire risk and optimal investments in watershed protection. *West Econ Forum* 12(2):19–28.
- Wilbenmeyer MJ, Hand MS, Calkin DE, Venn TJ, Thompson MP (2013) Risk preferences in strategic wildfire decision making: a choice experiment with U.S. wildfire managers. *Risk Anal* 33(6):1021–1037.
- Williams J (2013) Exploring the onset of high-impact mega-fires through a forest land management prism. *Forest Ecol Manag* 294:4–10.
- Wilson RS, Winter PL, Maguire LA, Ascher T (2011) Managing wildfire events: risk based decision making among a group of federal fire managers. *Risk Anal* 31:805–818.
- Wright HA (1982) Fire Ecology: United States and Southern Canada. John Wiley & Sons, New York, NY, USA.

To quote the report: “Our modern wildfire problems derive from a self-reinforcing cycle of counter-effective actions.”

We cannot keep using the same tired approaches that we have for the last 100 years. We need to make sure we are focusing on getting different results.

Common sense tells us that a response needs to be modified now that the problem is different. The Forest Service report does a great job of summing up what the Forest Service needs to do. The report says that altering the current trajectory will require a total system transformation. It bluntly states that maintaining the status quo will actually increase wildland fires, increase the losses we suffer from wildfires, and significantly affect the Forest Service’s ability to meet its core mission.

So we need new solutions. I am certainly going to work with the Chair and my colleagues here on the Committee over the next few months to find some of those solutions. I see four areas ripe for us to work on.

First, we need to do what we can to reduce the probability of catastrophic fires. We need to see at least double the amount of hazardous fuel treatments and double the amount of prescribed fire.

Second, fighting large wildland fires is becoming very expensive. Since 2000 the Federal Government has spent nearly \$24 billion just fighting the large wildfires. We need to ensure that Federal agencies have the money necessary to protect our communities, and we need to treat large wildfires differently in our budget.

Third, we need to make sure that spending and the management on the ground is being done to ensure accountability. We have seen questions about spending practices in the media, and we need to make sure that we are incentivizing the right kind of cost savings in the budget.

Finally, but most importantly, as I mentioned earlier, the assistance communities receive after the wildfire has started needs to be different. The assistance needs to show up quicker, and the assistance needs to be tailored to the issues that are being raised.

The Federal Government is responding to a new type of disaster where these events are blowing up in greater degree and reaching communities with unbelievable lightning speed. We need to have more proactive, upfront coordination with our Federal agencies—the Forest Service and FEMA, for example—in delivering real time communications and making sure that the resources, and I know the Chief will address this, are actually on the ground.

The fire season forecast came out last week, and it’s particularly troubling for our state. I hope the Forest Service is ready to help, and I hope FEMA will work to stage things like generators and assistance equipment closer to these areas so that they can respond more quickly.

Again, Madam Chair, thank you so much for this hearing. I look forward to the witnesses, and I look forward to working with our Committee to try to institute some new approaches.

The CHAIRMAN. Thank you, Senator Cantwell.

Let’s go ahead and get started with our witnesses. Depending on what happens with the vote we may just keep powering through or we may take a pause in the hearing.

I would like to welcome all of our witnesses before the Committee, particularly you, Chief Tidwell. I appreciate your leadership at the U.S. Forest Service. Next to Chief Tidwell we have Dr. Stephen Pyne who is a Regents' Professor at the School of Life Sciences at Arizona State University. Dr. Sharon Hood is with us this morning, and she is a post-doctoral researcher at the College of Forestry and Conservation at the University of Montana. We also have Mr. Bob Eisele. Am I pronouncing that correct?

Mr. EISELE. Eisele.

The CHAIRMAN. Eisele, okay. Mr. Eisele is the Watershed and Fire Analyst at the County of San Diego, California. I understand you are retired, so it is great to have you with us. Finally, we have Mr. Bruce Hallin, who is the Director of Water Rights and Contracts at the Salt River Project.

Chief, if we can begin with you. To each of the witnesses, we would ask that you try to limit your testimony to five minutes. Your full statement will be included as part of the record, but we look forward to your comments and the opportunity to ask questions afterwards.

Chief, good morning.

STATEMENT OF THOMAS TIDWELL, CHIEF, U.S. FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. TIDWELL. Good morning, Madam Chair, Ranking Member, members of the Committee. Thank you for giving us the opportunity to be here and especially with the other panel members today to be able to talk about not only our upcoming fire season but the things that we're currently doing and the things that we need to continue to do to address this issue.

As you both have already shared, the predictions for this coming fire season are similar to what we had last year with definitely a much more, more than an active fire season, primarily out in the West. And as the summer develops that's going to just continue to expand up to the northwest and then over into parts of Utah, Idaho and even into Montana.

You know, that being said, I can't stress enough that the fire seasons we're seeing today, these are the normal fire seasons. And so we can look at it and say, yes, they're more active than they were a decade ago, but it's important for us to understand that today this is the fire seasons that we're going to continue to have.

Once again, we have the resources. We made sure that we're going to have an adequate number of large air tankers to respond to these fires. The helicopters that we have, we already have 100 for our exclusive use and we can bring up another 200 helicopters if we need them. We'll have our fire fighters, our type one crews, over 900 engines just for the Forest Service. And then as always we have the MAFFs airplanes from the Air National Guard and the Air Force Reserve that are ready to come on when we hit those surge times of the year.

We are making a difference with the field treatments. When I look at the past, the millions of acres that we've been treating and the combination of managing a natural fire in the back country using prescribed fire and then our fuels treatments, primarily in the wildland urban interface, we are making a difference.

This year we plan to treat another 2.5 million acres of hazardous fuels in FY'15, and our FY'16 budget is calling for that same level. And every year and I can point back to the Slide Fire from just last year where these fuel treatments are making a significant difference to allow our fire fighters to more safely be able to suppress these fires. It reduces the severity, has less impact on the watershed and less impact on our communities.

Our challenge remains to be able to find more ways so that we can continue to increase the pace and scale of this work.

I want to thank the Committee for your support for our budget this year with that considerable increase in hazardous fuels funding. If we can maintain that going forward I think it will allow us to continue to increase this pace and scale along with the new authorities that we have with the Farm bill. As we move forward to being able to use that work, to be able to work closer and increase our coordination with the states and other partners to be able to get additional work accomplished.

The other thing I need to stress and it was pointed out already, the wildland urban interface. Not only are our fire seasons longer, hotter and drier, they're another 60 to 80 days longer than what they were just 15 years ago. We have over 50 million acres of wildland urban interface that we have to deal with.

And Madam Chair, as you pointed out in your statement, often the first thing we have to do with every fire is take the actions to be able to protect that community before we can even take on really suppressing these large wildfires.

Now, we continue to suppress 98 percent of the fires that we take initial attack on. That doesn't include the ones that we manage in the back country for the benefits, so I need to stress that. But even with 98 percent there's that one to two percent that escape. They're the ones that we see on the news. The ones that create the large costs. So again, I appreciate the support from members of this Committee to find a solution to deal with the cost of fire suppression.

Once again this year we're predicting there's a 90 percent chance that we will not have enough money. We will have to look at transferring funds. It is really past time. I know some of you are tired of listening to me talk about this, but it's really past time for us to find a solution and to be able to move on and to stop this disruptive practice of shutting down operations in the fall to be able to transfer money.

I think there is no question that one percent, this concept of one percent of our fires, should be considered natural disasters. And again last year the ten largest fires, the ten most costly fires, equaled about over \$320 million which really tracks with what we've been talking about, one percent, 30 percent of the cost.

So thank you again for having the opportunity to be here, and thank you again for the support you're providing us, not only to increase the work we're getting done, but also to find a solution to dealing with the cost of fire suppression.

Thank you.

[The prepared statement of Mr. Tidwell follows:]

**Statement of
CHIEF TOM TIDWELL
USDA FOREST SERVICE
BEFORE THE
ENERGY AND NATURAL RESOURCES COMMITTEE
UNITED STATES SENATE
May 5, 2015
Concerning
The Federal government's role in wildfire management, the impact of fires on
communities, and potential improvements to be made in fire operations.**

Introduction

Madame Chairman and Members of the Committee, thank you for the opportunity to present the views of the USDA Forest Service regarding the Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations.

The United States and the rest of the world are experiencing heightened levels of wildfire activity. We are seeing wildfires in the United States grow to sizes that were unimaginable just 20 or 30 years ago. Many states including Florida, Georgia, Texas, Colorado, California, Oregon, Arizona, New Mexico, and Washington experienced either the largest and/or the most destructive fire in their history within the last seven years. Extreme wildfire threatens lives and the natural resources people need and value, such as clean, abundant water; clean air; fish and wildlife habitat; open space for recreation; and other forest products and opportunities impacting the daily lives of many Americans.

We expect 2015 to continue the trend of above average fire activity. Our most recent forecast developed by Forest Service researchers at our Southern Research Station indicates there is a 90% chance that this year's fire suppression costs will be between \$794M and \$1.657B for the Forest Service, with a median estimate of \$1.225B. The median is above the 10 year average and would certainly force us to transfer funding from other vital land management programs to support suppression operations.

The 2014 wildfire season was substantial, with over 60,000 wildfires in the United States that consumed over 3.5 million acres across all ownerships. Significant fire activity (fires over 40,000 acres) burned in Oregon, Washington, Alaska, Arizona, Idaho, and California. These fires affected watersheds for millions of people. Wildfire destroyed a total of 1,953 structures in 2014, including 1,038 residences. California accounted for the highest number of structures lost in one state in 2014 with over 300 dwellings destroyed.

The responsibility to respond to wildfire is not isolated to the Forest Service. We work extensively with our partners within the Department of the Interior (DOI) as well as State and local firefighting organizations to support wildland fire management operations. These cooperators are essential to ensuring that every wildfire receives an appropriate, risk informed, and effective response regardless of the jurisdiction. Not only does the Forest Service rely on our cooperators, but those cooperators rely on the Forest Service to meet their operational and land management objectives.

The entire wildland fire community has and will continue to utilize the National Cohesive Wildland Fire Strategy (Cohesive Strategy) to align priorities and define responsibilities across wildfire activities including prevention, fuels treatments and response. The Cohesive Strategy has three components that include: 1) restoring fire-adapted ecosystems, 2) building fire-adapted human communities, and 3) responding appropriately to wildfire.

Preparedness Resources

The Forest Service and the DOI have the capability and responsibility to protect life, property, and natural resources while assuring an appropriate, risk-informed, and effective response to wildfires that is consistent with land and resource management objectives. We do this in close cooperation with States, Tribal governments, local governments, contract crews, and emergency/temporary hires. Firefighter and public safety are the primary considerations for all operations. The agencies continue to suppress approximately 98 percent of the fires on initial attack. However, the few fires that escape initial attack tend to grow quickly.

Within the FY2015 appropriation for Wildland Fire Management, we will be able to sustain comparable levels of firefighting assets as we have in previous years. We are able to leverage Call-When-Needed (CWN) aviation and ground based assets as the situation requires. We also coordinate with other Federal, State and local partners to maximize the utility of the community of assets to ensure we are able to respond when levels of fire activity increase. Approximately 10,000 firefighters from the Forest Service and 3,200 DOI firefighters are available for the upcoming fire season.

An integral component of our readiness is aviation resources. This year, we will have up to 21 airtankers available for operations on exclusive use contracts including: six legacy airtankers, up to 14 next generation tankers, and one agency owned/contractor operated HC-130H. The Forest Service also expects to have airtankers available through CWN contracts as well as the capability to mobilize cooperator airtankers if available through agreements with the state of Alaska and Canada. In addition, in 2015, the Forest Service will have available for wildfire suppression nationwide one CL415 Water Scooper through an exclusive use contract and one Single Engine Airtanker available through a shared Bureau of Land Management/ Forest Service exclusive use contract. The DOI additionally has 70 Single Engine Airtankers and four Water Scoopers to support wildfire response in situations where a smaller aircraft is the most effective tool. In coordination with the military, there are up to eight Mobile Airborne Firefighting System (MAFFS) capable C-130H available to meet surge requirements. We also have an extensive fleet of over 100 helicopters available to support response operations and 42 providing support from the DOI agencies.

The Forest Service continues to implement the 2012 Large Airtanker Modernization strategy that identifies the need for next generation tankers that have expanded capability and increased retardant delivery capacity. We have made progress modernizing our airtanker fleet with the impending transfer of the seven HC-130Hs from the Coast Guard, the upcoming acquisition of a next generation airtanker and the exclusive use contracting of up to 14 next generation airtankers. We have implemented several initiatives including the Aerial Firefighting Use and Effectiveness Program (AFUE) to help us better understand the best mix and use of our aviation assets to meet the changing conditions and operational requirements of wildfire response. AFUE will assist in establishing performance metrics and operational guidelines to improve our response capabilities and safety of our operators.

It is just as important to have substantial pre-seasonal planning operations occur with our cooperators and adjacent communities as it is to have our assets trained and ready to respond. The goal of building fire-adapted human communities provides context for our relationship with our cooperators and the public. We work to establish reasonable expectations as well as how the community can help be better prepared for wildland fire by participating in programs like Fire Wise, Fire Adapted Communities, creating Community Wildland Fire Protection Plans and implementing other mitigation and resiliency projects to offset and minimize the inherent risk that wildfire poses.

Suppression

Over the last few decades, wildfire suppression costs have increased as fire seasons have grown longer and the frequency, size, and severity of wildfires has increased due to changing climatic conditions, drought, hazardous fuel buildups, insect and disease infestations, nonnative invasive species, and other factors. These trends are expected to continue. Over the last 10 years, adjusting for inflation, the Forest Service has spent an average of almost \$1.13 billion on suppression operations annually. The Department of the Interior agencies adjusted suppression obligations for the same period is \$383.7 million. This change is attributed to many factors including increased development in the wildland urban interface, degraded ecological conditions, and a changing climate. There has been an increase in frequency of large catastrophic fires in which we expend significant financial resources.

We manage suppression costs by utilizing the best available information and applying the right resource at the right place, at the right time, for the right duration with the right plan. The largest fires we manage often present extraordinary attributes that create risks to people and other high valued assets that are difficult and costly to manage. We believe that by continuing to apply risk management principles, decisions will be made that not only provide an appropriate, risk informed and effective response to all wildfires, but also ensure that costs are commensurate with the values at risk.

The Forest Service and the DOI determined that 1 percent of fires consume about 30 percent of the wildfire suppression budget. The Administration believes these types of wildfires should be considered natural disasters and treated as such for funding purposes. Unlike other Federal

agencies responsible for responding to natural disasters, the Forest Service is required to fund its entire emergency management program through its regular appropriated discretionary budget.

The President's FY 2016 budget includes a proposal to reform the way that wildfire suppression is funded. The Administration's proposal aligns with the Wildfire Disaster Funding Act introduced this Congress. The reforms contained in these proposals are necessary and vital to ensure the Forest Service and the DOI are able to continue to deliver the full scope of their missions. Since FY 2002, the Forest Service has transferred funds from non-fire accounts seven times. In the same time period, the DOI has had to transfer funds to cover suppression obligations six times. Transferring funds to cover the cost of wildfire suppression is disruptive and harmful to other critical Forest Service and DOI programs and services, including efforts to reduce wildfire risk through mechanical thinning, prescribed fires, and other means.

Even in years when the Forest Service does not transfer funds from other programs the uncertainty created by the possibility of "fire transfer" means key projects, including those that contribute to forest health and hazardous fuels reduction, are put on hold in anticipation of a high wildfire activity year.

Hazardous Fuels

Decades of fire suppression and other factors have led to increases of fuels in many forest types across the country. Treating these acres through commercial thinning, hazardous fuels removal, re-introduction of low-intensity fires and other means can reduce fuel loads, provide forest products to local mills, provide jobs to local communities, and improve the ecological health of our forests and rangelands.

Fifty-eight million acres of national forests are at high or very high risk of severe wildfire. Out of the 58 million "high or very high" risk acres, we have identified approximately 11.3 million acres for highest priority treatment. These acres are in proximity to the wildland-urban interface or are in priority watersheds or water sources, are in frequent fire return regimes, and are not in roadless or wilderness areas.

Together with our partners in fire management, including Federal, State, local, tribal, nongovernmental, academia and landowner organizations, the Forest Service and DOI have worked collaboratively to develop the Cohesive Strategy of which fuel treatment is an essential component. Fuel treatments result in better outcomes on the land: more resilient, healthier ecosystems that provide the many benefits society wants and needs.

We control fuels in the wildland/urban interface (WUI) by removing buildup of dead vegetation and thinning over dense forests. We focus on treating high-priority areas, including municipal watersheds to protect water supplies. In FY2014, the Hazardous Fuels program treated more than 2.5 million acres on National Forest System and adjacent lands both inside and outside the WUI. The Hazardous Fuels program utilizes a decision support system called the Hazardous Fuels Priority Allocation System (HFPAS) to inform allocation decisions. Within HFPAS an assessment is completed that determines the likelihood that high intensity wildfires will intersect with residential areas and municipal water supplies. The results of the HFPAS analysis are

combined with other treatment and ecological objectives to inform the allocations. In 2015, we funded nationally competitive projects that will reduce the risk to communities and firefighters and increase the resilience of the forests. In addition, these projects target areas of high risk near communities that are actively working to reduce the fire risk to their community.

There are many other programs within the Forest Service that also reduce the risk of catastrophic wildland fires including the Collaborative Forest Landscape Restoration Program (CFLR). The CFLR assists in the agency's work with partners to conduct hazardous fuel treatments and ecosystem restoration that encourage economic and social sustainability, leverage local resources with national and private resources, reduce wildfire management costs, and address the utilization of forest restoration byproducts to offset treatment costs and benefit local economies. The CFLR uses a competitive process to select projects which foster collaborative, science-based restoration on priority forest landscapes across the Nation. Although CFLR is not the only program that contributes to this goal, the relationships the agency builds through this program provides models for how community partnerships can help advance landscape restoration efforts. In FY 2014, CFLR projects delivered substantial progress in restoring ecosystem resilience and reducing the risk of uncharacteristic wildland fire.

Since the first CFLR projects began implementation, the Forest Service has worked with partners to accomplish over 1.45 million acres of hazardous fuels treatments in the 23 project areas to reduce the risk of catastrophic wildfire. Approximately 870,100 of these acres treated were within the wildland-urban interface and 509,200 acres were outside of the interface.

The Forest Service's wood utilization program develops markets to reduce the cost of hazardous fuels treatments, forest management, and restoration activities. The USDA Wood to Energy Initiative is an interagency effort to expand renewable wood energy development and use. In FY 2015, the Forest Service awarded over 40 Wood Innovation Grants to communities, businesses, Tribes, States, and other organizations to help expand and accelerate wood energy and wood products markets through the country. The National Forest System is an important source of woody biomass and many of the CFLR projects are actively pursuing the development of woody biomass utilization opportunities. The National Forest System made 2.2 million tons of woody biomass available through the use of stewardship, logging, and other contracting authorities in FY 2014.

In the past four years, the USDA Wood to Energy Initiative resulted in more than 270 projects, roughly \$1 billion in USDA loans and grants, and increased private sector leverage for wood energy projects. In FY 2014, State and Private Forestry awarded \$1.25 million in grants for wood energy projects and \$2.5 million in cooperative agreements to establish 11 Statewide Wood Energy teams. The Forest Service also invested \$3 million in strategic alliances that successfully leveraged substantial non-Federal funding for wood energy initiatives in FY 2014.

The DOI is appreciative of the \$10 million in funding appropriated by Congress in FY 2015 to pilot the Resilient Landscapes program. The new program is a place-based, collaborative approach critical to the Interior agencies in meeting the Cohesive Strategy goal of restoring and maintaining landscapes across all jurisdictions that are resilient to fire related disturbances in accordance with management objectives. Interior received 29 proposals representing a variety of

ecosystems across the United States and inclusive of many different, agencies, tribes, and partners. The selection process should be concluded by the end of May. Selected proposals will begin restoring fire resiliency across landscapes this year, leveraging wildland fire management funds and efforts with agency resource management programs and partners.

In closing, we anticipate another active fire year as above normal wildland fire potential exists across the north central United States this spring while above normal wildland fire potential continues to threaten many parts of the West this summer. We look forward to the safe return of the brave men and women who serve on the front lines of protecting life and property during this year's fire season. We appreciate the introduction of the Wildfire Disaster Funding Act that will help the Forest Service and DOI avoid the need to transfer funds from other agency programs to pay for suppression. Finally, we welcome the opportunity work with the committee to identify ways to accomplish additional work to reduce the threat of fire by restoring the Nation's forests and rangelands.

The CHAIRMAN. Thank you, Chief. I think if there is one thing that we would agree on as members of this Committee is that we have got to figure out a way to stop the fire borrowing, because as we talk about all of the other things that go on within the Forest Service mission it comes back to the fact that you do not have the funds if you are using all of your budget to deal with these catastrophic fires.

I think what I would like to do in deference to the other members of the panel so that we can all hear your important testimony is just take a quick, three minute break. We are going to race fast to go vote and come back.

Senator CANTWELL. You are fast.

The CHAIRMAN. A minute and half there and back.

We stand adjourned for three minutes.

[RECESS]

The CHAIRMAN. We will come back to order. That is three minutes in Senate time. [Laughter.] We apologize for that break, but again, I think there are enough members here who wanted to hear the testimony from all the witnesses and as a courtesy to you we have made you hold over for a little bit longer.

Dr. Pyne, why don't we turn to you for your comments this morning? Again, thank you for your indulgence on time.

**STATEMENT OF DR. STEPHEN PYNE, REGENTS' PROFESSOR,
DISTINGUISHED SUSTAINABILITY SCHOLAR, SCHOOL OF
LIFE SCIENCES, ARIZONA STATE UNIVERSITY**

Dr. PYNE. Well, good morning and thank you for the opportunity to speak.

After the great fires of 1910 we spent 50 years trying to remove fire from the land. Call it a strategy of resistance. It sought to eliminate threats before they could become serious. That doctrine failed because it excluded good fires as well as bad ones.

We then tried to put good fire back in, and called this a strategy of restoration. Well, this strategy has now run its own 50 year course and the prospects and problems of its foundational doctrine, fire by prescription, are better understood.

Which leads to a consideration of what might the next 50 years hold. A strategy seems to be congealing in the West that we might label, resilience, that seems to make the best of the hand that we are being dealt.

So let me consider these strategies in turn.

Resistance. There remains an old guard who would like to return to the former order, and there are more progressive thinkers who want to upgrade that tradition into an all hazard, emergency service model, effectively urban fire departments in the woods or in a national sense, a kind of Coast Guard for the interior. Well, this makes sense if your primary land use is urban or ex urban, but it's expensive and it has not shown it can manage fires. If it retains the strengths of fire suppression it also magnifies suppression's weaknesses.

Restoration. Restoration too, has upgraded its mission from the simple hope that prescribed fire might substitute for wildfires. It now embraces complex collaborations, supplements prescribed burning with other treatments and tries to operate on the scale of

landscapes but determination endures, however, to get ahead of the problem. Yet the vision has proved costly, not only in money but in political and social capital. There is little reason to believe that the country will muster the will to rehabilitate at the rate or the scale required the tens of millions of acres believed out of whack.

Resilience. In the West a strategy is emerging that accepts that we are unlikely to get ahead of the problems coming at us. Instead it allows for the management of wildland fires to shift, where feasible, from attempts at direct control to more indirect reliance on confining and containing outbreaks. Of course there are some fires that simply bolt away from the moment of ignition and there are some that threaten people or critical sites right from the onset, but many fires offer opportunities to back off and burn out. These are not let burns rather fire officers concentrate their efforts at point protection where assets are most valuable. Elsewhere they will try to pick places, draw boxes, which they hold with minimum expenses, risks and damages.

While this strategy is compatible with Federal policy and in many respects moves in directions long urged by critics, though it can look like a mash up and the outcomes will be mixed because the fires are patchy, some patches will burn more severely than we would like. Some patches may hardly burn at all, but the rest will likely burn within a range of tolerance. Such burn outs may well be the future of prescribed fire in the West.

So without wishing to push an analogy too closely, we might liken the resistance strategy to a rock, the restoration strategy to scissors and the resilience strategy to paper. At any given time and place one trumps another and is in turn, trumped. We need all three. We need rocks around our prized assets and communities when they are threatened by going fires. We need scissors to buffer against bad burns and nudge toward good ones, and we need paper because the ideal can be the enemy of the good and a mixed strategy that includes boxing and burning may be the best we can hope for.

Thank you.

[The prepared statement of Dr. Pyne follows:]

Stephen J. Pyne
Human Dimensions Faculty, School of Life Sciences, Arizona State University

Good morning. I'm a professor in the Human Dimensions faculty, School of Life Sciences, Arizona State University. What I have to say is the result of 48 years associated with wildland fire in some capacity or other. Most recently, with funding from the Forest Service, DoI, and Joint Fire Science Program, I have been writing a history of wildland fire in America since 1960.

Modern fire management effectively began in the aftermath of the Great Fires of 1910. The Big Blowup traumatized the fledgling Forest Service and its chiefs for decades. One of the aftershocks, the 1911 Weeks Act, established the basis for a national infrastructure with the U.S. Forest Service as the institutional matrix.

For the next 50 years the country pursued a strategy of fire exclusion, so far as possible. The Forest Service connected federal agencies and states. It was a policy of *resistance* - that is, it sought to eliminate the fire threat by attacking every fire before it could become big, a kind of forward strategy. Part of the appeal of the policy was its administrative clarity and unblinking rules of engagement that mandated control by 10 am the morning following a fire's discovery. By 1960 the Forest Service had become a benign hegemon that controlled nearly every aspect of wildland fire and much of the rural fire scene.

This approach proved useful for rapidly building out a national system. It failed, however, as a universal strategy because it proved impossible to abolish fire, because those fires that did escape initial attack only became bigger, and because many landscapes suffered from a lack of fire. The strategy eliminated good fires as well as bad ones. It forced one agency to absorb and resolve all the tensions regarding how the national estate should be managed.

In the 1960s a new strategy of *restoration* emerged. It sought to reinstate the good fires lost under the previous regime, it wanted a more pluralistic oversight of policy than that provided by the Forest Service, and it nurtured a civil society to counter what was becoming a de facto government monopoly. Critically, it was not enough to have a stand-alone fire protection program: fire had to be integrated with land management. Over the next 15 years every federal land agency had its mission rechartered. As the purpose of those lands changed, so did their requirements for fire.

The first salvos in this fire revolution came in 1962. By 1968 the National Park Service had recanted the 10 am policy in favor of restoration; in 1978 the Forest Service achieved a complete overhaul of its fire mission and its financing. The new strategy pivoted around a concept of fire by prescription. Good fires would be introduced deliberately on working landscapes, and natural fires would be granted more room to do their ecological work in wild landscapes; both kinds of fire would be conducted under a specified set of guidelines called a prescription. Meanwhile, interagency organizations supplemented and then replaced the Forest Service as an overseer, and then they expanded from interagency programs to intergovernmental ones, and now they include NGOs and the private sector as well. The collapse of the old order was remarkably swift. It was like watching the Berlin Wall fall overnight. Or less dramatically, like watching the breakup of AT&T's telephone monopoly which happened at the same time.

The new strategy has now run its own 50-year course, and its problems and promises have sharpened. Prescribed burning has proved more a regional than a national project. It works as a foundational doctrine in the southeast and parts of the Great Plains - though no one seems to get as much burning done as they believe they need - but it has not become a routine operation in the West or Alaska. The prescribed natural fire died as a concept after the 1988 Yellowstone fires, though it continues to be reincarnated in other avatars.

The fire revolution overall stalled during the 1980s. The reasons are many; some within the purview of the American fire community, many not. Reforms renewed after the 1994 season, culminating in a common federal wildland fire policy (1995) and the National Fire Plan (2000). The project has had its successes and showcase programs, but the sad fact remains that the reformation in fire management has not achieved anything like the dimensions projected or needed. Most observers consider that the threats are outpacing our responses. Moreover, the institutional scene has been overwhelmed by competing purposes and new organizations including local-jurisdiction and volunteer fire departments, a gamut of NGOs from the Nature Conservancy to National Coalition of Prescribed Fire Councils, and private companies which have grown on such a scale that critics now speak of a fire-industrial complex.

Which leads to a consideration of what the next 50 years might hold. A new strategy seems to be coalescing in the West that we might label *resilience*. It accepts that we aren't going to get ahead of the problem overall, that too many variables are in motion, that the fire community controls too few of those causes to intervene in fundamental ways. It seeks to make the best of the hand we are being dealt, even if, paradoxically, American society is the dealer.

These three historical eras underwrite the three general strategies in play today.

Resistance. There remains an Old Guard from the 1960s who would like a return to the former order, and there are more contemporary thinkers who want to transform wildland fire organizations into an all-hazard emergency service, effectively urban fire departments in the woods, or at a national level, a kind of Coast Guard for the interior.

This is happening globally, motivated by desires to protect structures and lives. Evidence to date suggest that such a revival or a repurposing can help attend to a threatened public but it has not shown it can manage fire because it breaks the bond between fire management and land management. If it retains the strengths of fire suppression, it also retains suppression's formidable weaknesses as a singular strategy.

Restoration. Restoration remains an inspirational goal for many practitioners, either to return to a golden age in the past or to advance toward one in the future. Its motivation is a near-universal unhappiness with the existing scene. But restoration, too, has upgraded its mission to include complex collaborations, ways to supplement prescribed fire with other treatments, and a determination to get ahead of the problem, to gather and apply the best science in order to restructure the national estate in such a way that we can control bad fires and reintroduce good fires more easily, cheaply, and safely.

There are many projects actively underway. Yet if its vision still shines brightly, so, too, its problems continue to darken. It has proved costly, not only in money but in political and social capital. Research, reviews, NEPA protocols, endless conversations among stakeholders - these are a necessary exercise in democracy but can take years. Moreover, the actual area involved is small relative to the size of the challenge. The threats are growing bigger and faster than our responses. We need flexibility to operate on landscape scales, not only geographically but institutionally. We need to move beyond single projects and events. There is little reason to believe that the country will muster the will to rehabilitate at the rate or scale required the 39-58 million acres believed out of whack.

Resilience. In the West a strategy is emerging that accepts, in fact if not in doctrine, that we cannot get ahead of the problems coming at us. Instead, it allows for the management of wildland fires to shift, where possible, from attempts at direct control to more indirect reliance on confining and containing outbreaks. Of course there are fires that simply bolt away from the moment of ignition. But many fires offer opportunities to back off and burn out. It is hoped that this strategy will prove

more cost effective and safer for fire crews, while introducing some degree of semi-controlled ecological burning. These are not let-burns. Rather, fire officers concentrate their efforts at point protection where assets are most valuable such as communities, municipal watersheds, or sequoia groves. Elsewhere they will try to pick places - draw boxes - which they can hold with minimum costs, risks, and damages. A given fire might see aggressive firefighting on one flank, or on one day, and a more removed burning out on another flank or at another time.

The strategy is compatible with federal policy, and in many respects moves in directions long urged by critics and even the GAO, though it can look like a mashup and the outcomes will be mixed. Some patches will burn more severely than we would like (maybe 15-20%?), and some will barely burn at all (another 15-20%?), but the rest will likely burn within a range of tolerance. Such burnouts may well be the future of prescribed fire in the West. If so we need to do them better, and we need to understand how to build future landscapes out of the patchy aftermath of the megafires that characterize the current regime.

Equally, we need a reordering of the institutional landscape. In political terms we are witnessing the American fire community's euro moment. We either truly integrate, or we break up, or we tolerate endless bailouts. The National Cohesive Strategy could become the start of a kind of fire constitution that redefines for our federal system the roles, rights, and responsibilities of the many, many players in the American way of fire. It could do for the future what the Weeks Act did after the Big Blowup.

So, three strategies. It's worth pointing out that all fire strategies suffer failures and at roughly the same rate. Some 2-3% of wildfires escape initial attack. Rough estimates suggest a comparable number of prescribed fires escape or fail to do the ecological work expected. And we can expect similar breakdowns with landscape restoration.

Without wishing to sound flip or push an analogy too closely, we might call the resistance strategy a rock, the restoration strategy a scissors, and the resilience strategy a paper. At any given time and place one trumps another and is itself trumped. All three remain in play, and all three are needed. We need rocks around our prize assets and communities when they are threatened by going fires. We need scissors to buffer against bad burns and nudge toward good ones as part of managing healthy land. And we need resilience because the ideal can be the enemy of the good, and a mixed strategy that includes boxing-and-burning may be the best we can hope for.

Thank you.

The CHAIRMAN. Thank you, Dr. Pyne.
Dr. Hood, welcome.

STATEMENT OF DR. SHARON HOOD, POST-DOCTORAL RESEARCHER, COLLEGE OF FORESTRY AND CONSERVATION, UNIVERSITY OF MONTANA

Dr. HOOD. Good morning, Chairman Murkowski, Ranking Member Cantwell and members of the Committee. Thank you for inviting me here today.

My name is Sharon Hood. I'm a post-doctoral researcher at the University of Montana. Previously I worked as a U.S. Forest Service ecologist prior to earning my Ph.D. in organismal biology and ecology at the University of Montana in 2014.

Fire and native bark beetles have huge impacts on conifer forests across our country. Today my testimony focuses on my research showing that fire and thinning can increase Ponderosa Pine resistance to Mountain Pine Beetle, but also that thinning is not a substitute for fire.

Ponderosa Pine has adapted to survive frequent, low severity fire, a type of fire that burns through the forest understory, but generally causes little mortality to larger trees; however, lack of fire since the late 1800's has increased tree density and change species composition in many areas. We continue to actively suppress the majority of wildfires today; however, there is recent acknowledgement such as the 2014 National Action Plan for the National Cohesive Wildland Fire Management Strategy that we must allow more fires to burn to promote healthy forests, resilient to wildfire, insects, disease and drought.

To achieve the goal of allowing more fires to burn we must accept the critical role of fire as a natural ecological process. My research supports the need for frequent, low severity fire in Ponderosa Pine forest in three ways.

One, low severity fire increases resin ducts. These ducts are used by trees to make resin, or pitch, that helps resist bark beetle attacks and trees with more ducts are more likely to survive attack.

Two, when frequent low severity fires were moved from Ponderosa Pine forests resin duct defenses decline over time.

And three, low severity fire acts as a natural thinning agent to reduce forest density. This also promotes an increase in resin duct defenses that increases resistance to Mountain Pine Beetle.

I examined the effects of thinning and fire on resistance to a Mountain Pine Beetle outbreak at a long term study site in Western Montana. These treatments were originally designed to study how to effectively restore Ponderosa Pine forest and increase resilience to wildfire. They were implemented five years before the outbreak began. Resin ducts increased after thinning with and without burning and remained higher than the control and burn only treatments throughout the length of the study. Mortality for Mountain Pine Beetle differed markedly between treatments. In the control 50 percent of the Ponderosa Pine was killed in an outbreak compared to 20 percent in the burn only and almost no mortality in the thin only and thin burn combination treatments.

High levels of Douglas Fir in both the control and burn only treatments due to over 100 years of fire exclusion, coupled with a

high pine mortality from bark beetles has reduced stand resilience beyond the ability to return to a Ponderosa Pine dominated system and the absence of further disturbance or management.

My results applied a dry pine, Ponderosa Pine, forest in the inland Northwest. A forest type where there is strong, scientific support that frequent low and mixed severity fires were once common. Further research is needed to determine if fire increases tree defenses in other fire dependent, pine forest types throughout the U.S. I found thinning with and without prescribed fire increased resistance to a Mountain Pine Beetle outbreak, greatly reducing tree mortality.

In the long term, however, thinning with prescribed fire created the most resilient forest by stimulating tree defenses and through the beneficial effects of killing understory vegetation. These and other critical ecological effects of fire cannot be replicated by thinning alone. While thinning is a very useful and oftentimes necessary restoration and management tool, fire is crucial for long term maintenance of low to mid elevation fire of Ponderosa Pine forests through both impacts of forest structure and composition and by stimulating defenses that can increase tree survival from bark beetle attacks.

There is no one size fits all approach to restoring fire dependent forests. Proactive restoration treatments should aim to increase forest resilience to a multitude of stressors and foster conditions that allow wildfires to burn under more natural intensities.

While my study is just one example, these findings are supported by other scientific literature showing the critical role of fire in creating resilient Ponderosa Pine forest.

Thank you again for the opportunity to testify here today.

[The prepared statement of Dr. Hood follows:]

Statement of
Dr. Sharon M. Hood
College of Forestry and Conservation
University of Montana
Before the
Committee on Energy and Natural Resources
U.S. Senate
May 5, 2015
Concerning
The Federal Government's Role in Wildfire Management, the Impact of Fires on Communities, and
Potential Improvements to be made in Fire Operations

Good morning Chairman Murkowski, Ranking Member Cantwell, and Members of the Committee. Thank you for inviting me here today to discuss my research on fire and bark beetle interactions. My name is Sharon Hood, post-doctoral researcher in the College of Forestry and Conservation at the University of Montana. I have lived in Montana since 2001, first working as a fire ecologist with the USDA Forest Service, Rocky Mountain Research Station for 12 years and then earning my PhD from the Organismal Biology and Ecology Program in the Division of Biological Sciences at the University of Montana in 2014. I was a USDA Forest Service term employee while conducting much of my dissertation research. My research focuses on the ecological impacts of fire and bark beetle interactions on coniferous forests. Today, I will focus my testimony on my dissertation research about the impacts of removing wildfire on ponderosa pine resistance to mountain pine beetle, while also drawing from the scientific literature. This research was based on data collected primarily in Montana, but also in Idaho, Oregon, and Utah, and I would like to use it as an example to highlight three main messages.

My main messages are: (1) fire plays an essential role in many of our Nation's forests, (2) management activities in ponderosa pine forests can affect resistance to mountain pine beetle, (3) a combination of basic and applied research on fire and bark beetles is imperative for development of tools for management of our Nation's forests in an ecologically sustainable way.

BACKGROUND

Wildfire and native bark beetles have huge impacts on coniferous forests. These disturbances have shaped forests for millennia, often affecting the same areas. Therefore, while fire and bark beetles each have direct impacts on the species composition and structure of our forests, one disturbance type can also indirectly affect other types of future disturbances. Anthropogenic changes to historical fire regimes have altered flammability, changing the intensity, extent, and effects of subsequent fire in many ecosystems (Ryan et al. 2013). A significant event in the fire history of many western North American forests is the near total cessation of low-severity fires since the late 1800s due to domestic livestock grazing, road building, a reduction in burning by Native Americans, and organized fire suppression (Pyne 1982). These factors have reduced fire frequency and thus greatly impacted fire-dependent forests reliant on frequent, low-severity fires for persistence on the landscape (Pyne 1982, Keeley et al. 2009). Prior to fire cessation, low-severity surface fires burned frequently (<35 years) over an estimated 34% of the total land in the United States (Schmidt et al. 2002). I use the term low-severity fire to describe surface fires that burn through the forest, but generally cause little mortality to larger trees (Hood 2010). Native bark beetles are dominant biotic disturbance agents, capable of causing massive tree

mortality in temperate coniferous forests in North America (Raffa et al. 2008). These aggressive bark beetles typically occur at very low population levels, causing limited mortality. However, periodically widespread regional climatic triggers can allow populations to rapidly increase to outbreak levels during which beetles kill large extents of coniferous forests (Raffa et al. 2008). Relative to previously recorded outbreaks in the past century, recent bark beetle outbreaks have been synchronized across western forest landscapes, resulting in extensive tree mortality (Bentz et al. 2009). These recent outbreaks have been attributed to direct and indirect effects of climate change and, in some cases, past land management practices (Bentz et al. 2009, Bentz et al. 2010).

For my dissertation research, I focused on ponderosa pine (*Pinus ponderosa*) defenses against the native mountain pine beetle (*Dendroctonus ponderosae*). As one of the most broadly distributed conifers in North America, ponderosa pine is of huge ecological and economic importance (Oliver and Ryker 1990). Ponderosa pine is adapted to survive frequent, low-intensity/low-severity fire (Hood 2010). Fire exclusion in ponderosa pine dominated forests during the last century has resulted in increased density and forest composition conversions to shade-tolerant species in many areas (Allen et al. 2002, Keeling et al. 2006). Ponderosa pine is host to several plant eating bark beetle species, including the native mountain pine beetle, an aggressive bark beetle that has recently killed trees over 8 million hectares of pine species in the western U.S. and Canada (Meddens et al. 2012). Conifers have an extensive defense system to resist attack from bark beetles. The primary defense is resin, a complex mixture of chemicals, many of which are toxic to beetle metabolism and can affect beetle communication (Raffa 2014). In pines, resin is produced and stored in an interconnected network of vertical (axial) and horizontal (radial) resin ducts (also called resin canals) in the inner bark and wood (Bannan 1936). As bark beetles bore into a tree during attack, they sever resin ducts and this allows resin to flow to the attack site. Copious amounts of resin act as a physical barrier to attacking beetles and is the first line of defense to prevent entry.

I had three overarching research questions, each of which is briefly presented here. (1) Are resin ducts a good measure of resistance to bark beetles? (2) Does fire influence resin duct production? (3) How do management practices affect individual tree defense and scale up to affect forest resistance to a mountain pine beetle outbreak? This research provides new information on the physiological relationship between tree growth and defense, and how fire impacts these defenses to ultimately impact forest resistance to bark beetle attacks.

RESEARCH

(1) Are resin ducts a good measure of resistance to bark beetles?

Resin ducts represent the production and storage capacity of resin in the tree. While resin is the main defense, it is an extremely variable trait. This complicates efforts to characterize the defense potential of trees (Gaylord et al. 2011). Therefore, resin ducts may be a better measure for defense than resin flow because duct measurements are repeatable and imprinted every year when trees deposit new wood and produce annual growth rings. This leaves a permanent record of changes in defense production over time. I compared resin ducts between pairs of trees – those that died from a mountain pine beetle attack and those that survived the attack. Trees that survived the attack had larger ducts and more area of the growth ring in ducts than trees that died from the attack (Fig. 1) (Hood et al. 2015). These results are supported by other studies in several pine species, which consistently show that trees with higher resin duct production and/or larger ducts are more likely to survive beetle attacks (Kane and Kolb 2010,

Gaylord et al. 2013, Ferrenberg et al. 2014, Hood et al. 2015) and drought (Heres et al. 2014).

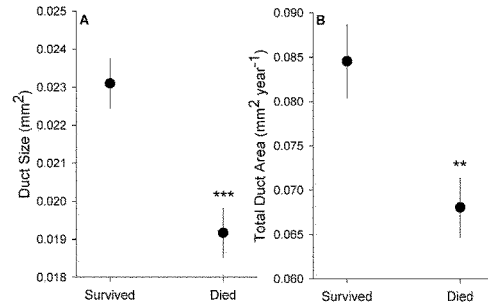


Figure 1. Resin duct (A) average size and (B) total duct area of ponderosa pine that died and survived attack by mountain pine beetle. ** $P < 0.01$; *** $P < 0.001$ From: Hood et al. 2015.

I further investigated the relationship between resin flow and resin duct characteristics to establish the important biological link that more ducts translate to increased resin flow for the tree to defend itself from bark beetle attacks. Of several different measures, the best predictors of resin flow were average resin duct size (for example, one large pipe transports more water than many small pipes) and total resin duct area, both of which increased with tree growth rates (Fig. 2). However, growth rate alone did not predict resin flow. While slower growing trees invested more in resin duct defenses per unit area of radial wood growth, the total amount of duct production was lower and they produced less resin. These results indicate that forest management that encourages healthy trees with larger resin ducts should increase resistance to bark beetles because resin ducts are a reliable, good measure of resistance because they are positively related to resin flow (Hood and Sala In Review).

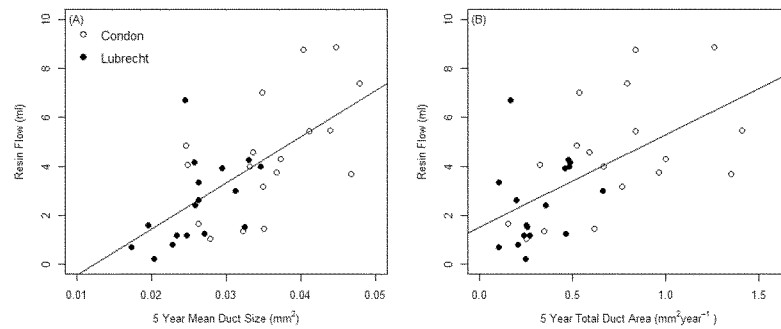


Figure 2. Average monthly resin flow as a function of (A) 5-year mean duct size ($F_{1,10} = 12.47$, $P = 0.0054$; site: $F_{1,10} = 0.04$, $P = 0.8388$) and (B) 5-year total duct area ($F_{1,10} = 7.38$, $P = 0.0217$; site: $F_{1,10} = 0.49$, $P = 0.5002$). From: Hood and Sala, In Review.

(2) How does fire influence resin duct production?

Based on previous research showing low-severity fire increases resin flow (Perrakis et al. 2011), I hypothesized that low-severity fire increases resin ducts in ponderosa pine to better resist bark beetle attack, and that lack of low-severity fire relaxes resin duct defenses in forests dependent on frequent, low-severity fire. I measured resin ducts using tree cores with crossdated chronologies (i.e., wood samples for which I knew the calendar year of each annual ring and the year of each fire occurrence) in several natural ponderosa pine stands before and after an individual wildfire and also before and after an abrupt decrease in fire frequency in the 20th century. Low-severity fire increased resin duct production (Fig. 3) and resin duct production declined when fire ceased (Fig. 4) (Hood et al. 2015). These results demonstrate that low-severity fire can increase resin-duct related defenses against bark beetle attacks and that excluding fire decreases tree defenses over time.

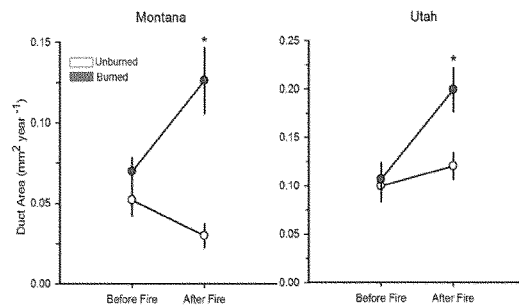


Figure 3. Average total resin duct area (mean \pm SE) for burned and unburned ponderosa pine trees before and after wildfire at Montana and Utah sites after accounting for ring area. One-tailed significance values indicate duct area increased after fire on burned trees. From: Hood et al. 2015.

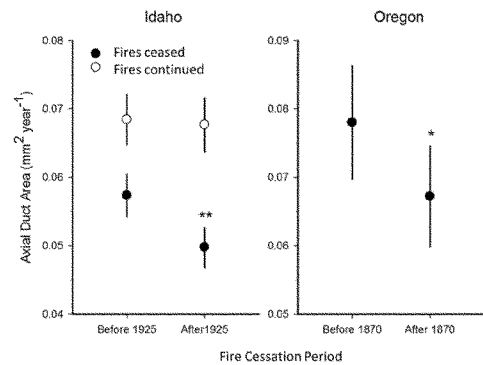


Figure 4. Ponderosa pine resin duct area (mean \pm SE) before and after fire cessation in Idaho and Oregon. We defined fire cessation as the period following the last recorded fire at a site, determined from tree-ring reconstructions. The Idaho site was divided into two areas: open circles are sites where fires continued in the 20th century, solid circles are sites where fires ceased in the 20th century. One-tailed significance values indicate duct area decreased when fires ceased after 1870 in Oregon and after 1925 in Idaho. From: Hood et al. 2015.

(3) How do management practices affect individual tree

defense and scale up to affect forest resistance to a mountain pine beetle outbreak?

I investigated susceptibility to mountain pine beetle attack and forest resilience in a fire-dependent ponderosa pine forest as a function of stand structure resulting from the absence of frequent, low-severity fire during the 20th century, and subsequent management treatments to mitigate the negative effects of lack of fire. I capitalized on an existing study of fire and stand density treatments (Fiedler et al. 2010) implemented approximately 5 years prior to a naturally occurring mountain pine beetle outbreak to explore how tree-level defense and stand structure contribute to bark beetle attack success and ultimately forest resilience from a natural disturbance. While the effects of forest management on bark beetle attack patterns have been widely studied, virtually no studies with replicated thinning and fire treatments exist that were subsequently subject to a widespread bark beetle outbreak. This offered a unique opportunity to explore the ecological effects of disturbance interactions with far-reaching management implications for the resiliency of fire-dependent coniferous forests.

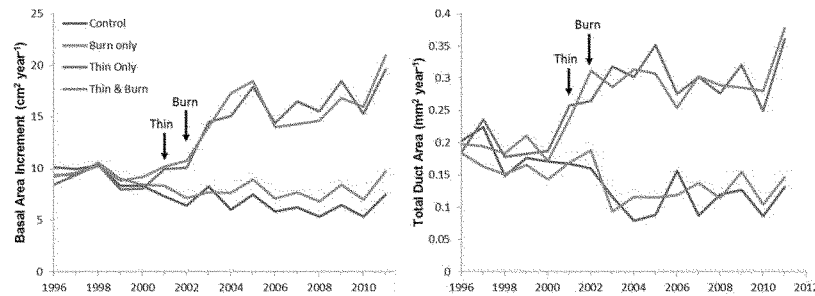


Figure 5. (A) Yearly mean basal area increment (i.e., annual wood production) and (B) total duct area by treatment. Arrows denote year of thinning (Winter 2000-2001) and prescribed burns (Spring 2002).

Annual tree growth and resin duct size and production increased after the thinning, with and without burning, and remained higher than the control and burn-only throughout the length of the study, 11 years post-treatment (Fig. 5). We attribute the minimal resin duct production in the burn-only treatment to the fact that prescribed fires were conducted in the spring, while natural fires in this region typically occur in the late summer or fall. Mortality from mountain pine beetle was markedly different between treatments: in the control approximately 50% of the ponderosa pine > 10 cm diameter was killed in the outbreak compared to 20% in the burn-only, and almost no mortality in the thin-only and thin-burn treatments (Fig. 6). The high mortality in the control caused a shift in species dominance to Douglas-fir (*Pseudotsuga menziesii*) (Fig 7). The large Douglas-fir component in both the control and burn-only due to fire exclusion, coupled with the high pine mortality from mountain pine beetle has likely reduced resilience of this forest beyond the ability to return to a ponderosa pine-dominated system in the absence of further disturbance or management. These results suggest that excluding frequent fire from this system has greatly decreased resistance from bark beetle outbreaks. This study, also supported in the scientific literature, shows that management treatments that reduce tree density and remove shade-tolerant species can increase resistance to bark beetles in the short-term (Hood 2014). An important caveat is that these treatments were conducted before the bark beetle outbreak began;

therefore, we do not know if they would be effective if implemented during an outbreak. In the long-term, frequent, low-severity fire in this system is necessary to prevent the growth of shade-tolerant species such as Douglas-fir (Allen et al. 2002, Keeling et al. 2006) and to repeatedly stimulate resin-duct defenses against bark beetles (Figs. 3 and 4).

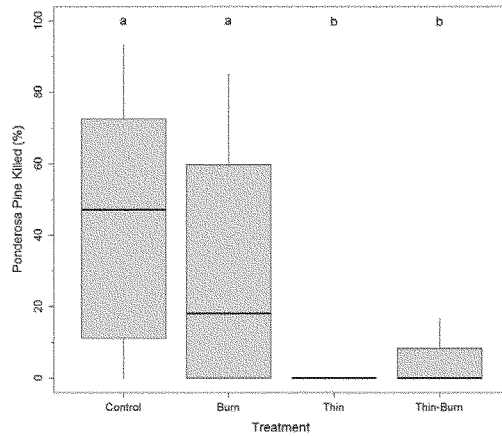


Figure 6. Percent of ponderosa pine killed by mountain pine beetle between 2005 and 2012. Different letters indicate mortality is significantly different between treatments ($\alpha = 0.05$). Boxes denote first and third quartiles, lines the median, and whiskers the 1.5 inter-quartile range (IQR).

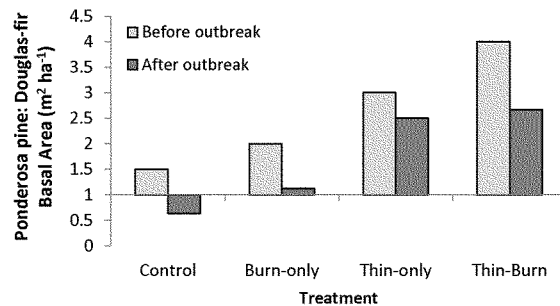


Figure 3. Ratio of host (ponderosa pine) to non-host (Douglas-fir) basal area before (2005) and after (2012) the mountain pine beetle outbreak. Numbers > 1 indicate dominance by ponderosa pine. Numbers < 1 indicate dominance by Douglas-fir.

CONCLUSIONS

Based on my research, I hope it is clear that fire plays an essential role in many of our Nation's forests. I focused my testimony on ponderosa pine in dry areas of the Northern Rockies – a forest type where there is strong scientific support that low-intensity, low-severity fire was the dominant fire regime. Other coniferous forests types throughout the U.S. also experienced frequent, low-severity fire prior to European settlement (Hood 2010). My research shows that frequent wildfire stimulates resin duct defenses against bark beetles and that lack of fire decreases resin duct defenses, potentially increasing susceptibility to beetle attack and subsequent mortality. These and other critical ecological effects of fire cannot be replicated by thinning alone. While thinning can be a very useful and sometimes necessary restoration tool, fire is crucial for long-term maintenance of early-successional pine forests through both impacts on forest structure and composition and through stimulation of defenses that can increase resistance to bark beetle attacks. My research shows that thinning, with and without prescribed fire, increased resistance to a naturally occurring mountain pine beetle outbreak. However, thinning with prescribed fire created the most long-term resilient forest to future disturbances because of the additional effects of fire-stimulated defenses and through the beneficial effects of killing understory vegetation.

Finally, I hope my research demonstrates the importance of both basic and applied research in managing U.S. forests. Without basic research, applied research can become greatly hindered because the underlying biological mechanisms are unknown, limiting effective extrapolation of scientific research to other ecosystems or novel climates and leading to a high level of uncertainty. Maintenance of a long-term research site (Fiedler et al. 2010) with periodical monitoring, the Inland Empire Tree Improvement Cooperative ponderosa pine genetic trials, and past archived data were also essential for the research I presented today. My research was dependent on prior research projects conducted by Emily Heyerdahl (USDA Forest Service), Anna Sala (University of Montana), Barbara Bentz (USDA Forest Service), and Eric Keeling (New Paltz State University of New York). Continued funding of basic and applied research is imperative to increase our understanding of how fire and bark beetles interact in order to develop the best possible tools to manage our Nation's forests in an ecologically sustainable way.

This research was possible through funding from the USDA Forest Service, Rocky Mountain Research Station, Fire, Fuel, and Smoke Science Program, the IM-SURE Program of National Science Foundation Award #0755560 and 1157101, National Science Foundation EPSCoR Track-1 EPS-1101342 and EPS-IIA-1443108 (INSTEP 3), and the University of Montana's Bertha Morton, David Nicholas, Clancy Gordon, and Drollinger-Dial scholarships.

This concludes my prepared statement. I am happy to take any questions you may have.

REFERENCES

- Allen, C., M. Savage, D. Falk, K. Suckling, T. Swetnam, T. Schulke, P. Stacey, P. Morgan, M. Hoffman, and J. Klingel. 2002. Ecological restoration of southwestern ponderosa pine ecosystems: a broad perspective. *Ecological Applications* **12**:1418-1433.
- Bannan, M. 1936. Vertical resin ducts in the secondary wood of the Abietineae. *New Phytologist* **35**:11-46.
- Bentz, B., J. Logan, J. MacMahon, C. D. Allen, M. Ayres, E. Berg, A. Carroll, M. Hansen, J. Hicke, and L. Joyce. 2009. *Bark beetle outbreaks in western North America: causes and consequences*. University of Utah Press.

- Bentz, B., J. Regniere, C. Fettig, E. Hansen, J. Hayes, J. Hicke, R. Kelsey, J. Negron, and S. Seybold. 2010. Climate change and bark beetles of the western United States and Canada: Direct and indirect effects. *Bioscience* **60**:602-613.
- Ferrenberg, S., J. Kane, and J. Mitton. 2014. Resin duct characteristics associated with tree resistance to bark beetles across lodgepole and limber pines. *Oecologia* **174**:1283-1292.
- Fiedler, C., K. Metlen, and E. Dodson. 2010. Restoration treatment effects on stand structure, tree growth, and fire hazard in a ponderosa pine/Douglas-fir forest in Montana. *Forest Science* **56**:18-31.
- Gaylord, M., R. Hofstetter, T. Kolb, and M. Wagner. 2011. Limited response of ponderosa pine bole defenses to wounding and fungi. *Tree Physiology* **31**:428-437.
- Gaylord, M., T. Kolb, W. Pockman, J. Plaut, E. Yezzer, A. Macalady, R. Pangle, and N. McDowell. 2013. Drought predisposes piñon-juniper woodlands to insect attacks and mortality. *New Phytologist* **198**:567-578.
- Heres, A., J. Camarero, B. López, and J. Martínez-Vilalta. 2014. Declining hydraulic performances and low carbon investments in tree rings predate Scots pine drought-induced mortality. *Trees-Structure and Function* **28**:1737-1750.
- Hood, S., and A. Sala. In Review. *Pinus ponderosa* resin defenses: controls on constitutive resin flow and induced responses. *Tree Physiology*.
- Hood, S., A. Sala, E. K. Heyerdahl, and M. Boutin. 2015. Low-severity fire increases tree defense against bark beetle attacks. *Ecology*.
- Hood, S. 2010. Mitigating old tree mortality in long-unburned, fire-dependent forests: a synthesis. Gen. Tech. Rep. RMRS-GTR-238, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- Hood, S. 2014. The impacts of removing wildfire on *Pinus ponderosa* resistance against *Dendroctonus ponderosae*. University of Montana. Dissertation.
- Kane, J. and T. Kolb. 2010. Importance of resin ducts in reducing ponderosa pine mortality from bark beetle attack. *Oecologia* **164**:601-609.
- Keeley, J., G. Aplet, N. Christensen, S. Conard, E. Johnson, P. Omi, D. Peterson, and T. Swetnam. 2009. Ecological foundations for fire management in North American forest and shrubland ecosystems. Gen. Tech. Rep. PNW-GTR-779. Page 92. USDA, Forest Service, Pacific Northwest Research Station, Portland, OR.
- Keeling, E., A. Sala, and T. DeLuca. 2006. Effects of fire exclusion on forest structure and composition in unlogged ponderosa pine/Douglas-fir forests. *Forest Ecology and Management* **237**:418-428.
- Meddens, A., J. Hicke, and C. Ferguson. 2012. Spatiotemporal patterns of observed bark beetle-caused tree mortality in British Columbia and the western United States. *Ecological Applications* **22**:1876-1891.
- Oliver, W., and R. Ryker. 1990. Ponderosa Pine. Pages 836-863 in R. M. Burns and B. H. Honkala, editors. *Silvics of North America: 1. Conifers; 2. Hardwoods*. Agriculture Handbook 654. USDA, Forest Service, Washington, DC.
- Perrakis, D., J. Agee, and A. Eglitis. 2011. Effects of prescribed burning on mortality and resin defenses in old growth ponderosa pine (Crater Lake, Oregon): four years of post-fire monitoring. *Natural Areas Journal* **31**:14-25.
- Pyne, S. J. 1982. *Fire in America. A cultural history of wildland and rural fire*. Princeton University Press.
- Raffa, K. 2014. Terpenes Tell Different Tales at Different Scales: Glimpses into the Chemical Ecology of Conifer - Bark Beetle - Microbial Interactions. *Journal of Chemical Ecology* **40**:1-20.
- Raffa, K., B. Aukema, B. Bentz, A. Carroll, J. Hicke, M. Turner, and W. Romme. 2008. Cross-scale drivers of natural disturbances prone to anthropogenic amplification: the dynamics of bark beetle eruptions. *BioScience* **58**:501-517.
- Ryan, K., E. Knapp, and J. Varner. 2013. Prescribed fire in North American forests and woodlands: history, current practice, and challenges. *Frontiers in Ecology and the Environment* **11**:e15-e24.
- Schmidt, K., J. Menakis, C. Hardy, W. Hann, and D. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87, USDA, Forest Service, Rocky Mountain Research Station, Ft. Collins, CO.

The CHAIRMAN. Thank you, Dr. Hood.
Mr. Eisele, welcome.

**STATEMENT OF ROBERT EISELE, WATERSHED AND FIRE
ANALYST, COUNTY OF SAN DIEGO, CALIFORNIA (RETIRED)**

Mr. EISELE. Good morning, Senator Murkowski, Senator Cantwell and the members of the Committee. It's an honor for me to be here to share my experience with you today.

I've been involved with fire my entire life. I started with the volunteer fire fighter to prescribed burner for the County of San Diego, fire behavior analyst on a Federal incident management team for 15 years, and I like to think of myself as a student of fire.

I've learned in Southern California that we will always have extreme fire weather. We will always have a drought, but there will always be ignitions and ignitions are plentiful and they are random so the driver of the entire system is fuel. A young fuel does not burn very well and doesn't burn very fast even under extreme conditions. Old fuel conversely burns extremely hot and extremely well, extremely fast.

For example, the origin and the age of the fuel of origin, at origin of fires in Southern San Diego County in the past, since 1950, the average age of the fuel where the fires, the big fires start, was 71 years. And we don't find any fires starting in fuels less than 20 years old go to become major fires.

The fire problem in San Diego County has gotten worse and it's kind of leading the nation. Again, California is not a good spot to be in the lead, but what we've seen in California in the past 50 years is becoming the norm in the Western United States.

So I see two main issues with the fire. Fire and cost.

We recognize that the fire problem is the fuels. We're now treating close to two percent of the hazardous fuels which is a 50 year rotation cycle which means that as we're doing a great job we're not even getting close. So we need to be doubling at least our fuel treatment and it has to be mechanical and fire because it is, the forests, have overgrown to the point that the fire will not thin them. It has to be thinned and then maintain thin with the fire.

We need projects that are picked by Forest Service multi-disciplinary teams of people not just fire, but forest health people and sociologists and risk assessments to pick the ones that are going to get us the big bang for the buck because we don't have enough money to do it all. We need to spend our dollars wisely.

We need to look at NEPA. San Bernardino National Forest is on its fourth year of a one-year NEPA proposal or EIS for 20,000 acre, general EIS document. People are gaming the system on NEPA, and NEPA is a good idea. We need to be doing it, but we're not building a shopping center or freeways. We're mitigating the damage to the forests.

The budget process, I'd point out that there is a FEMA does a plan for state and local and tribal governments when the fires meet a certain criteria, FEMA picks up 75 percent of the costs. It seems like they could do that for the Federal agencies also or somewhat similar.

We can reduce the cost of fires by managing them better, and I think there's a technological asset here. We need to be able to have

the guy on the ground with a laptop computer that can predict where the fire is going and then measure the results of what they're doing based on that.

We need to know where the fire is. It's hard to believe that we don't know where the fire is on some of these fires because we can't see them through the smoke and we can't map them. And they need to map them in the first day, not three days later.

So that kind of technology is, I believe, it's going to go a long way to managing things like managing the fire and then managing the air assets. We can model where our aircraft are good and effective and where they're not so good, and we can then let the fire managers make those kinds of decisions based on sound science.

A safety issue with our fire fighters is every so often we wind up having a disaster like Yarnell Hill. We need to know where the fire is. We need to know where the fire fighters are, and the people that are supervising those fire fighters need to have a map in their hand that shows them where everybody is on the ground. That's totally doable. It would have to be satellite-based, but just knowing where they are doesn't help. It's the guy in charge of them that needs to know where they are.

So I put a bunch of other suggestions inside my testimony, and I appreciate the opportunity to comment today.

[The prepared statement of Mr. Eisele follows:]

Statement of
Robert “Bob” Eisele
County of San Diego, (retired)
BEFORE THE
ENERGY AND NATURAL RESOURCES COMMITTEE
UNITED STATES SENATE

May 5, 2015

Concerning

The Federal government’s role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations.

Senator Murkowski, Senator Cantwell, members of the committee, I am pleased to be able to share some of my studies and experiences in wildland fire this morning.

My background

I was born in San Diego, California into a fire family. My father served the City of San Diego Fire Department for 37 years, retiring at the rank of Battalion Chief. Our family vacations were spent camping in the Cleveland National Forest with occasional trips to the San Bernardino Mountains. The summer before I started the first grade, our campground and its surrounding area was radically changed by the 50,000 acre Conejos fire. My childhood trips to the mountains were spent watching the chaparral regrow among the skeletons of dead oaks, shrubs, and pines. In 1956, I vividly remember newspaper headlines “11 PERISH IN FIRE” proclaiming the death of 11 firefighters constructing fire line, downhill, in the Inaja Fire. This disaster spawned the “Ten Standard Fire Fighting Orders.”

As a young volunteer firefighter, I knew I could put out any wild fire – “just get out of my way and let me at it.” A little more experience and words of wisdom from veterans lead me to look at fire differently. Dr. Harold Biswell, a professor of forestry at UC Berkeley, introduced prescribed fire to San Diego in an era where wildfire professionals claimed that there was nowhere in California that standing vegetation could be safely burned at any time of the year. Dr. Richard Minnich at UC Riverside argued that the natural wildfire system was fuel driven, not weather driven. Spending a few harrowing minutes defending structures during the 1970 Laguna Fire gave me new respect for extreme fire behavior. These were crazy, game changing

ideas and experiences. So how did I test this new hypothesis that young fuels don't burn well, even under extreme conditions?

Since conducting a scientific experiment of fire behavior during extreme weather conditions is problematic, I searched the historic records, looking for examples of old fires constraining new ones. It didn't take very long. In October of 1967, a natural experiment in wild fire spread occurred. The Pine Hills Fire, driven by strong Santa Ana winds, burned a total of 7,000 acres west of Julian, CA. Two hours later, the Woodson Fire started in Ramona, burning 29,000 acres and numerous houses. Conditions seemed to favor the spread of the Pine Hills Fire with steep terrain, a wind corridor, and rugged roadless terrain. But by the second day, when winds subsided, the fire had stopped, on its own, mid slope, above the San Diego River. The same area had burned eleven years earlier in the Inaja Fire. The Woodson burned through the wildlands surrounding the community of Poway. Spread halted the next day when the winds stopped, some 29,000 acres and many destroyed homes later. It was apparently true that young vegetation doesn't carry fire well.

With the advent of Geographic Information Systems (GIS) and CAL FIRE's statewide data base of historical fires, I undertook a study of the impacts of old burns on fires. Fire after fire revealed the same story, the borders of a new fire coincided with the borders of a preceding fire like pieces in a puzzle. The community of Pine Valley was spared from the devastation of the 1970 Laguna Fire by the Cove Fire of 1962. The 1956 Inaja Fire was halted by the 1950 Conejos, 2000 Pechanga by the 1989 Vail, 2003 Paradise by the 1993 Guejito, etc. More recently, in May of 2014, the Cocos Fire halted on a ridge line in the 1996 Harmony burn. There are many more examples.

Some wind driven fires burned through old burns, but not at the same rate and intensity as they consumed old vegetation. In the 2007 Witch Fire, the rate of spread in the old burn was reduced by a factor of eight from the 2003 Cedar fire. Pushed by 12 mph NE winds, the Cedar Fire traveled the 8 miles between the San Diego River at Cedar Creek and the Barona Fire Station in four hours, a speed of two (2.0) mph. Stronger 20 mph NE winds spread the Witch Fire through the same route in 33 hours – a speed of one quarter (0.25) mph. The fire was easily halted at the Barona Fire Station by a strike team of local government engines.

My experience has shown that while young vegetation does not support large fires, the opposite is true. It requires old fuel to support conflagrations. San Diego's climate is likened to a boom or bust cycle. Wet years stimulate plant growth; dry years cause dieback. Over time, dead branches are built up on and beneath the live plants. It's the dead vegetation that provides the kindling for large fires. The average age of the vegetation at the origin of fires over

10,000 acres is greater than 71 years. Large fires need to start in old fuels in order to spread with the intensity and rapidity necessary to overwhelm the fire suppression forces.

How did southern California get in the situation it finds itself today?

To understand what has happened here, we must look at the fire history of both the United States and Mexico, especially where the two nations share a common border in southern California. The United States was populated by northern and central Europeans who came from the forested parts of Europe that did not generally have the fire conditions like those experienced in the western United States. Thus the government's reaction to fires like the 1910 "Big Burn" was to institute a fire suppression system to protect the valuable lumber resource. Had the "Big Burn" been identified as a slash disposal problem, not a fire problem, I wonder if we'd have this fire problem today. Contrast this approach with that of Mexico, populated mostly by the Spanish and the indigenous Mexicans. They accepted fire as natural grazing by cattle and sheep limited fire spread in grasslands.

To this day, there is no organized fire suppression in Baja California Norte (BCA). The International border is artificial with little difference in weather, topography, rainfall, and vegetation on either side of the border. In fact there is more similarity between San Diego county and Baja California Norte than between San Diego and Ventura counties.

Fire suppression is generally believed to have commenced with the founding of the Forest Service in 1905, augmented in California by the Division of Forestry in 1919. It's not quite that simple. On May 31, 1793, the Spanish governor of Alta and Baja California prohibited Indian burning and instructed that all fires be suppressed. That date marks a turning point in land management plans in California. From 1793 forward, landscape fires became less frequent until 1840 when all San Diego Indians were moved to reservations and fire essentially disappeared from the dendrochronological record. Fuel accumulated until, in the early 1900's, it gradually reached "critical mass."

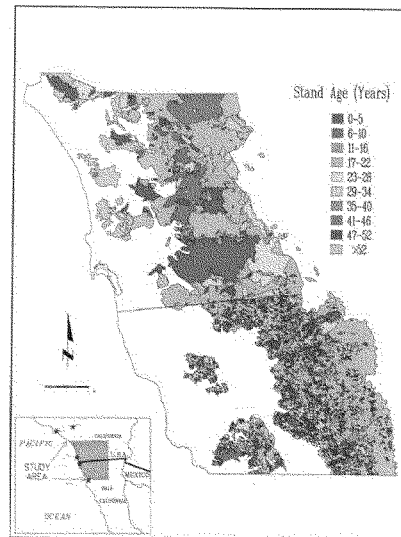


Figure 1. A comparison of fire sizes between San Diego County (upper) and Baja California (lower).

Dr. Minnich recognized another natural experiment, contrasting San Diego county with Baja California Norte (BCA). He painstakingly reconstructed the fire history of BCA from a series of aerial photographs. From his research, he found that the average annual acres burned are very similar on both sides of the border. The difference is in fire size. BCA is a mosaic of small fires up to ca.7500 acres, primarily burning in summertime moderate conditions. Most of the acreage in San Diego is consumed in a few large fires of up to 280,000 acres burning under extreme (Santa Ana wind) conditions. The unintended consequence of aggressive and effective fire suppression is a shift from moderate intensity summertime fires to wind driven conflagrations.

“Examination of the fire history SCA [southern California] and BCA leads to several fundamental conclusions vital to fire management. Most important, fire poses a cyclical threat in space and time. The removal of fuels by fire precludes a recurrence for decades.” Minnich. 2001

Large fires burned 50-60,000 acres in the first half of the 20th century. But in 1970, things seemed to change. The Laguna and Boulder fires together burned 190,000 acres and destroyed 382 structures. Other southern California counties experienced large fires that burned statewide ca.80,000 acres, destroyed 722 homes and killed 16 people. Out of this disaster came the Incident Command System, adopted by all southern California fire agencies as a common incident management system.

190,000 acres was an outlier, or was it? The new century brought 2003 Cedar and Paradise Fires with 16 fatalities, 330,000 acres, 2500 structures; statewide 22 fatalities, ca.750,000 acres, and over 4000 structures destroyed. Four years later, the Witch, Harris, Poomacha, and Rice Fires killed 7 people, burned ca.350,000 acres and destroyed ca.1,800 structures. Statewide in the 2007 fires 10 died, ca.500,000 acres burned, and ca.3210 structures were destroyed.

There is a saying that “as California goes, so goes the nation.” This is certainly the wrong place for California to be the leader. Old timers predicted that the forests would follow the chaparral fire regime with large explosive fires. The 2013 Rim Fire, the 2014 King Fire, and the 2008 lightning series in northern California seem to prove them right.

Nationwide, fires are larger and more costly, although ignitions have decreased. Acres burned nationally for the ten year period 2005-2014 have doubled over the period 1975-1984, thirty years earlier. The number of fires has DECREASED by a factor of 2. Ignitions are random and ubiquitous. There are more than enough fire starts to maintain the present fire regime.

The metric that some percent of the fires are stopped at less than some acreage is irrelevant. It's the initial attack escapes that matter.

In spite of our best intentions, the law of unintended consequences proclaims that we are, in actuality, managing for stand replacement fires. It's the old fuel and the overstocked vegetation that causes the large fire problem, not the initial heat source.

Funding Fires and Reducing Costs

Many have looked at the rising cost of fire suppression and proposed ideas to reduce cost or limit the rate of increase. Certainly the air program is the most expensive part of wildfire operations. Unfortunately, it has become a metric in the minds of many to measure the cost of any other expenditure on the fire ground. "Well, my request costs less than a single air tanker drop [so it's inconsequential]."

Part of the increase is required by changes in governmental regulations, such as limits in work hours per day, the shift to bottled water, disposal of gray water, and environmental restrictions on the use of retardants and mechanized equipment.

Other costs include improved fire camp computer systems, scores of air conditioned office trailers and briefing tents, reluctance on the part of the home unit to release the team until no source of heat remains on the fire, unscrupulous contractors that game the system, inability to obtain necessary resources in a timely manner and reluctance to release them when the need is reduced, invasive plant concerns requiring expensive "weed washers" whose effectiveness is questionable, and additional positions required on IMTs such as Human Resources Officers and Liaison Officers that could be added to the incident only if needed.

Local government resources are expensive because most work a 24 hour schedule which requires their parent agencies to be reimbursed on a 24 hour basis. The mitigating factor is that local government firefighters are being trained in large wildland fire operations which increase their value on local, state, and federal fires. One cost saving approach on large incidents has local government resources report to the incident just before the peak burning period begins and releases them each evening after the structure threat has passed. Another option is to release local resources while retaining more distant units. The local units can be recalled as surge force if conditions warrant.

The federal agencies do not have the numbers of willing and available personnel to staff these fires. Traveling great distances for 14 days away from home (which is almost always 16 days due to travel days) is difficult for an employee in a family where both parents work. Society has changed; mom works too. Or mom works for the fire agency. Or both parents work for a fire agency.

So the only practical method of reducing costs is to incentivize the teams in that direction. Presently, the incentive is to put the fire out with the least impact on the local community and the resource. Answering the question, "Why didn't you have enough engines or helicopters or air tankers to save my house?" is the prime motivation for ordering resources. Cost is secondary. Every division needs more engines and crews. Every section could use more help.

Rewards for saving money could be more assignments, national recognition, citations in personnel files, and support from forests and other units toward cost savings. Developing metrics that compare team performance against a computer model of incident complexity and risk would keep cost saving in the minds of the teams.

Local and state governments are eligible for a 75% cost share from FEMA for major fires. "The Fire Management Assistance Grant Program (FMAG) provides a 75 percent Federal cost share and the State [tribe or local government] pays the remaining 25 percent for actual cost." (FEMA) This could serve as model for a similar program on federal lands.

Air asset costs are discussed later in this statement.

What for the Future?

Yogi Berra said, "Predicting is difficult, especially if it's about the future." However, we know we have a fuels problem. We are presently treating about 2 % of our 190 million acres in need. (Wildfire Management: Federal Funding and Related Statistics. February 4, 2015. Congressional Research Service) (<http://www.fs.fed.us/publications/policy-analysis/fire-and-fuels-position-paper.pdf>)

This represents a 50 year rotation cycle in forests, many with 10-20 year natural fire intervals, and it is likely occurring in the areas which are less complex to implement. In the next 50 years we are warned to expect significant increases in temperature with potential decreases in precipitation and precipitation patterns. So it is apparent that we are not even treading water.

Are we abandoning our wilderness and roadless areas and old growth forests to stand replacement fires?

Hazardous fuels reduction. Millions of acres of fire dependent forests and other lands are multiple fire cycles from their natural fire interval. In some parts of the country such as the southwest, climate change may be severe enough to threaten entire forests with massive tree die off due to drought. We should be looking at climate models to determine how many trees per acre can survive in the new climate. Some can benefit from prescribed fire but most will require mechanical thinning before the application of fire. We need to select areas that are accessible to mechanical equipment so that forest can be treated economically. If the forest products removed by thinning have value, those proceeds of sales should be used to offset the cost of thinning. Trees to be removed must be selected by a multi-discipline team of experts

considering fire behavior, tree health, diversity, randomness, etc. Well-meaning environmental groups force compromises upon agencies that result in projects that make no natural or environmental sense. There are forests today that look like the power pole national forest – all old large trees evenly spaced.

Not all forests require mechanical treatment. High elevation forests such as those in Yosemite National Park can be treated by allowing naturally ignited fires to burn. They must be allowed to continue every year because they presently are not meeting their acreage objectives. Some areas burned in earlier fires need fire again. Blanket national policies requiring all fires to be suppressed are reminiscent of the policies that got us where we are today. The success of the prescribed fire program in Yosemite was shown in the 2013 Rim Fire by the lack of tree damage in treated stands.

NEPA

The National Environmental Policy Act (NEPA) requires the federal land management agencies to consider that all environmental factors are weighed equally when compared to other factors in the decision-making process to perform some action on federal land. It has become a weapon in the hands of the few to block anything, or at least delay projects. It diverts dollars from fuels reduction to staff preparing and revising an Environmental Impact Statements (EIS). For example, the San Bernardino National Forest proposed a watershed wide EIS for the 21,000 acre Santa Ana watershed.

NOI in Federal Register 11/06/2012 **Description:** Fuels reduction within a 21,000-acre analysis area to reduce the risk of high intensity wildfire to adjacent communities, organizational camps, and recreation residences. Occurs within Sugarloaf IRA DATES: Comments concerning the scope of the analysis must be received by December 6, 2012. The draft environmental impact statement is expected July 2013 and the final environmental impact statement is expected September 2013.

The revised date for the draft EIS is June of 2015 with the final expected January of 2016. Over three years to undertake an action that is prudent and necessary for ecosystem health and the protection of life and property is a misapplication of the intent of the law.

NEPA has other unintended effects. A large interagency prescribed burn on Cleveland National Forest and Cuyamaca State park was conducted in the spring of 2003. Due to the complexities of getting an EIS for riparian areas, those portions were excluded from burning. When the 2003 Cedar Fire contacted the prescribe burn area, it halted. However, the untreated riparian areas acted as wicks and carried the wild fire through the project and into the untreated areas outside.

These objections to action are frequently by those that want the forest left natural. But that option has been co-opted by decades of fire suppression. To do nothing is not the option because to do nothing is to doom the forest to a stand replacement fire. There must be a way to simplify the process without jeopardizing the environment. There are hundreds of dedicated federal employees who are doing their utmost to manage our public lands in accordance with sound scientifically based practices. They appreciate the support they received from Washington.

Strategically Placed Landscape Treatments (SPLATS) methodology should be used to select areas for treatment.

SPLATS are blocks of fuel treatments ranging from several to hundreds of acres each, placed in a way that controls the speed and intensity of fire as it moves. The pattern of placement is determined through fireshed assessments and designed to eliminate continuous pathways of untreated fuel that fire might use to race from the bottom of slopes to ridge tops. The goals are to keep fire on the ground, slow it down, and reduce its intensity so it can be modified across large landscapes. (http://www.fire.science.gov/projects/04-2-1-84/project/04-2-1-84_final_report.pdf)

SPLATS site criteria should also be based on access by mechanical equipment, natural fire breaks, and the projected climate change effects.

Previous Stand Replacement Burns.

A new issue will be forthcoming with fuels. Forests that have had stand replacement fires will have snags and logs for 20 plus years. Shrubs that follow these large destructive fires are resistant to fire while they are young. But the areas may burn again like occurred in the Rim fire, contributing to the fire intensity and corresponding plume dominated fire behavior. Predicated climate changes will intensify this phenomenon.

The present drought may be cyclical or it may be climate change related. In either event, this is a critical issue that calls for national leadership reminiscent of the early days of the space program. We can hope that the climate molds are wrong, but “hope is not a plan.”

Technology

The wildland fire forces are woefully behind in technology. Spanish fire fighters have had GPS location transmitters by law for over seven years. Our management teams have taken charge of fire that does not have an accurate map of the fire’s location. The internet is replete with programs and apps related to fire. But many, if not most, wildland fires don’t have internet access. Fire spread models take longer to run than some fires spread. Behave, the fire behavior calculator program, is not available on a smart phone. Many innovations have come from team

members, not their parent agencies. And some innovations such as crew members carrying smart phones, pictures posted on social media, etc. are resisted by management.

GPS units placed on individuals or units would probably be desirable. But these are not a panacea. They have batteries, they fail, they get lost, etc. They must use satellites or a combination of satellites and the internet for coverage purposes. That doesn't mean that because they are not perfect, they are not good. Do we assign someone (\$\$) to watch the screen 24/7? Do we just go look if we sense a need? Do we build a geo-fence around them that alerts if they change position beyond predetermined point or line? And knowing where they are when they call for help does not necessarily mean rescue. Aircraft must see the ground and be close enough to the ground to make effective drops. Drops from high altitudes reach the ground over a wide area as a light mist, not enough concentrated enough to impact an intense fire. Drops prior to the fires arrival and more importantly the smokes arrival could be effective.

There exists today a device capable of creating an ortho-rectified map of a fire, detailing fire line, intensity, and spot fires and posting that map on the internet. The aircraft flies above the fire and above the Temporary Flight Restriction (TFR) imposed around wildfires where aircraft are operating. Estimated cost is \$250,000 each. (Airplane and crew extra) I used maps from this system on a fire in 2007. Without a near real-time map of the fire line and spread direction, equipping crew with GPS transmitters for safety reasons is somewhat limited.

Incident Management Networks and Software

The Incident Base needs to be computerized. Much has been done towards this goal but it seems to be lagging the technology. One of the easiest ways to reduce costs would be to automate the release of resources. 20 person crews or 5 person engines can be held over for 24 hours due to inefficiencies in the demobilization process. The system should be tested on simulated incidents, not beta tested on going wildfires.

Air Assets

Air tankers are effective on initial attack fires, yet there seems a hesitancy to use them until ground units arrive on scene and make a request. A system should be designed to consider weather and fuels data, time of day, etc. that suggests to dispatchers that an air tanker or helicopter should be sent.

Pretreating areas in advance of the fire is questionable at best. Effectiveness of these tactics should be scientifically examined and policy developed for their use.

Heavy helitankers may be more effective than air tankers if adequate water is available in a short turnaround time.

When structures are actually threatened, the public will demand that the air assets fly, effective or not. During the 2007 fires in San Diego County, Navy and Marine Corps helicopters were pressed into service. It is credit to the professionalism of the pilots and the interagency team of air operations staff that this was done safely. To my knowledge, no study was conducted to determine the effectiveness of this action. The public was mollified.

When structures are not directly threatened and air tankers are ineffective, they should be held ready for new starts. This is the biggest opportunity to save dollars but it will take clear, unambiguous policy directive to make this happen. For example, there are always structures "threatened," no matter what the real threat may be. A definition of threatened, both quantitative and qualitative is needed. Here is where an accurate near real time map of the fire and a fast, laptop, fire spread model would provide an objective assessment of structures at risk and the role air assets could play in protecting them. It is important to note that air tankers and heavy helicopters must be able to see the targets in order to safely fly. Where fire is spread is highest, where structures are at most risk, and where crews are at most risk, the air tankers cannot operate.

Helicopters are being used for mop up at risk to pilots and ground crews greater than the benefit. They are a very expensive, risky, and an inefficient way to deliver water.

Wildland Urban Interface/Intermix (WUI)

Wildland-urban interface are lands within and adjacent to (usually within ½ mile from) communities that abut or are surrounded by wildlands potentially subject to wildfires. Homes are being constructed out of cities adjacent to the wildlands and inside of the wildlands. Decades of fire suppression have left forests vulnerable to catastrophic fire. The changes in forests have happened slowly, imperceptible to most humans. The over-stocked, dense forests of today are seen as normal.

Fire Safe Councils

Fire safe councils are grassroots community-based organizations which share the objective of making California's communities less vulnerable to catastrophic wildfire. Firewise communities develop an action plan that guides their residential risk reduction activities, while engaging and encouraging their neighbors to become active participants in building a safer place to live. Formal recognition as a Firewise Community is obtained from the National Fire Protection Association. These communities have had successful outcomes during wildfires. However they

seem to proliferate after a major fire but as the fire fades from memory, so do the organizations. The large fire return interval in a community is probably greater than 50 years. The challenge is to find those communities at risk today and gear up the existing organizations for the long haul.

Community Wildfire Protection Plans (CWPP) have shown to be successful in small communities and subdivisions of larger ones. Homeowners prepare the plan, organize community “chipping days,” and help each other maintain defensible space in their communities. Larger cities have hired consultants to do the work which misses the point. These need to be grass roots operations. The residents must complete the plan, with guidance from agencies, because, as General Eisenhower said, “Plans are nothing, planning is everything.” San Diego has many CWPPs as result of the fires of 2003 and 2007.

Building Codes

San Diego has had the strictest building codes in the state since 2003. Homes built under these codes fared better than other houses in the 2007 fires. However, it is not possible to distinguish structure saves due to building construction from save due to vegetation clearance incidental to the home building process. Homes become lived in, housekeeping is an issue, embers will set fire to anything flammable, vegetation must be free of dead wood and flammable litter, mulch will carry fire etc. Building codes are extremely variable state by state, county by county, city by city. A grant criterion tying eligibility or amounts to building codes may have merit. We can’t just keep requiring more and more stringent building codes followed by running big fires at the houses to see how they do.

Defensible Space

One size can’t fit all. Buildings catch fire from radiant heat, convective heat, and embers. And like building a campfire, kindling is a necessary component. With the proliferation of smart phones, the agencies should build an application that would gather all the pertinent data for a given structure and determine the optimum treatment needed to make the property defensible.

Defensible space implies that someone or something will be there defending the improvements. There will never be enough large fire engines with 3 to 5 trained fire fighters to defend all the houses threatened in major fires. The public has been taught to evacuate at the first hint of danger and expects government to protect the property. The perennial argument between wildland agencies and local government is that structure fire protection is the responsibility of local government vs. the structures are threatened because of the wildland fire. Let’s agree that both groups have a point and work together.

- We need to train able-bodied homeowners to stay with their houses IF their houses are defensible.
- Establish a program, perhaps with FEMA, to partially fund the acquisition of slip on units for local and state government designated vehicles to be stored and maintained until periods of extreme fire danger or active fires. Vehicle would be staffed by a trained agency driver and a trained fire fighter, volunteer or off duty paid. These would be organized into task forces under the direction of a qualifier task force leader and used to follow the fire front and prevent homes from igniting.
- Increase training in structure protection and wildland operations for local government forces.
- Cost share fuels treatment within 500 feet (?) of development and minimize the permitting burden for residents to conduct fuel modification on federal land (firewood gathering?)

Summary

- Double (at least) the number of acres treated under the Hazardous Fuels Program.
- Revisit criteria for selecting areas for treatment including cost per acre, forest health, climate impacts, and risk of stand replacement fire.
- Modify NEPA to simplify and expedite the process for forest fuel management actions.
- Incentivize teams for reducing costs while insulating them from criticism caused by the perception of not having enough resources.
- Adopt a program similar to FMAG for federal wildfire disasters.
- Develop metrics and computer models for appropriate and effective use of air assets while minimizing risks to aircrew and ground personnel.
- Train and partially equip state and local government personnel in post fire front structure protection tactics.
- Equip each unit (Engine officer, Squad boss, Dozer, etc.) with satellite GPS locating devices and each supervisor with satellite based display devices for each unit under their command.

- Adopt existing Forest Service Research FireMapper system and install on at least one aircraft per region.
- Adopt real time fire modeling software to allow field commanders to make decisions based on science based projections of fire spread.

The CHAIRMAN. Thank you, Mr. Eisele.
Last we will go to Mr. Hallin, welcome to the Committee.

**STATEMENT OF BRUCE HALLIN, DIRECTOR, WATER RIGHTS
AND CONTRACTS, SALT RIVER PROJECT**

Mr. HALLIN. Chairman Murkowski, Ranking Member Cantwell and members of the Committee, thank you for the opportunity to testify before you today. My name is Bruce Hallin, and I'm the Director of Water Rights and Contracts for Salt River Project, or SRP.

For over 100 years the Salt River Project has provided a reliable water supply to metropolitan Phoenix. To fulfill this responsibility SRP operates seven dams, 1,300 miles of canals and numerous ground water wells. Importantly we're also dependent on the health of a 13,000 square mile watershed to provide a renewable water supply and protecting these headwaters has been a priority of SRP since its founding.

Around the turn of the 20th century watershed protection efforts focused on setting aside lands in the Federal forest system to ensure development in timber harvest were conducted in a way that preserved a sustainable water supply for Arizona.

Today, the unhealthy state of these national forests are causing catastrophic wildfires that threaten the sustainability and quality of drinking water for millions in Arizona. This situation is not unique to Arizona. We are working closely with the National Water Resources Association and others who are facing similar threats to their headwaters.

Catastrophic fires have severe and long term impacts to watersheds which are felt far beyond the area directly impacted by the fire. Unlike the low intensity fires seen in healthy forests, the aftermath from the severe fires we are experiencing as a result of the unnatural forest conditions increase sediment loads and debris that reduce storage capacity at our reservoirs and affect the predictability of runoff.

Water quality is deteriorating as a result of fire activity on our watershed. Increased organics and sediment in the SRP water supply have led to increased capital and operational costs at city water treatment plants. These treatment facilities have been upgraded to handle the increased levels at a cost of hundreds of millions of dollars.

We know from science and experience exactly what needs to be done to mitigate these impacts. We know that we need to act quickly to thin overcrowded and unhealthy forests. We know we need to reestablish a forest products industry to carry out treatments and create an economy around forest restoration, and we know we need public policy at all levels of government to facilitate and invest in forest restoration.

SRP is actively involved in efforts to expedite forest restoration by committing resources in all of these areas. Few are engagement in public/private partnerships. For example, we have started the Northern Arizona Forest Fund in partnership with the National Forest Foundation to raise funds and invest in forest restoration projects that protect our watershed. We are also involved in a project with the Forest Service, Bureau of Reclamation, City of

Payson and the National Forest Foundation to treat the 64,000 acre watershed that drains into the CC Cragin Reservoir.

The projects that we are currently involved with highlight the need to improve Federal policy to more efficiently make progress in restoring our forests and protecting our watersheds. Specifically there is a need to improve both fire suppression budgeting and the planning and compliance process for restoration projects.

The CC Cragin Project I mentioned is a perfect example of why we need to address both of these issues at the same time. We greatly appreciate the priority the Forest Service and the Department of Interior has placed on this project; however, despite the significant funding and staff dedicated to undertake the project, it is expected to take at least two, if not three, years before any thinning can be done on the ground.

This is too long to simply hope that a fire doesn't destroy the Cragin Watershed. We must find a way to move forward more quickly on critical projects like this by utilizing the significant data and knowledge that already exists within the Forest Service.

My written testimony includes some additional policy suggestions but I wanted to highlight one issue related to fire borrowing. As the Committee continues to address fire suppression budgets it is also important that the provisions include a dedicated and secure funding stream for forest restoration in order to promote the certainty needed to encourage private sector investment.

The greatest risk to our forests is catastrophic wildfire, and we need to rebalance the requirements placed on these types of projects to reflect that reality. The problems, the solutions and the consequences of inaction are clear. I look forward to working together with this Committee on our shared goals of protecting the forests and watersheds our communities rely on and enjoy.

Thank you, again, and I look forward to answering any questions you may have.

[The prepared statement of Mr. Hallin follows:]

**Testimony of Bruce Hallin
Director, Water Rights and Contracts
Salt River Project**

**Before the
Senate Committee on Energy and Natural Resources
Hearing on “the Federal government’s role in wildfire management, the impact of fire on
communities, and potential improvements to be made in fire operations”**

May 5, 2015

Chairman Murkowski, Ranking Member Cantwell and members of the Committee, thank you for the opportunity to testify before you on “the Federal government’s role in wildfire management, the impact of fire on communities, and potential improvements to be made in fire operations.” For over a hundred years, the Salt River Project (SRP) has responsibly managed water supply for the Phoenix valley including efforts to protect the forested headwaters that provide the majority of the water for metropolitan Phoenix. Around the turn of the 20th century, watershed protection efforts centered on setting aside lands in the federal forest system to ensure development and timber harvest were conducted in a way that preserved a sustainable water supply for Arizona. Today, the unhealthy state of these forests, created in large part to protect the water flowing from them, has led to catastrophic wildfires that threaten not only the wildlife, recreational, and multi-purpose value of these forests, but also the reliability, sustainability and quality of drinking water for millions of Arizonans.

SRP is currently involved with several forest restoration projects which have highlighted the need for federal action to address both fire suppression funding and the planning and compliance processes in order to accelerate the pace and scale of work needed to protect our forestlands and water supply. As the Committee has recognized, fixing the annual “fire borrowing” that often funds fire suppression, at the expense of preventative restoration activities, is important to increase the capacity of projects the U.S. Forest Service can administer. We appreciate efforts by the Chairman, Ranking Member, Senators Flake and McCain, and other senators to find an acceptable solution to this ongoing problem. However, budget is only one of several issues that must be addressed. The length of time it takes to undertake the required planning, environmental compliance, and administrative activities also needs to be addressed to recognize delayed action increases the risk of a catastrophic fire that will damage our national forests and watersheds, ecosystems, and species for decades.

Salt River Project

SRP is composed of the Salt River Valley Water Users’ Association (“Association”) and the Salt River Project Agricultural Improvement and Power District (“District”). Under contract with the federal government, the Association, a private corporation authorized under the laws of the Territory of Arizona, and the District, a political subdivision of the State of Arizona, provide water from the Salt and Verde Rivers to approximately 250,000 acres of land in the greater Phoenix area. Over the past century, most of these lands have been converted from agricultural to urban uses and now comprise the core of metropolitan Phoenix.

The Association was organized in 1903 by landowners in the Salt River Valley to contract with the federal government for the building of Theodore Roosevelt Dam, located some 80 miles northeast of Phoenix, and other components of the Salt River Federal Reclamation Project. SRP was the first multipurpose project approved under the Reclamation Act of 1902. In

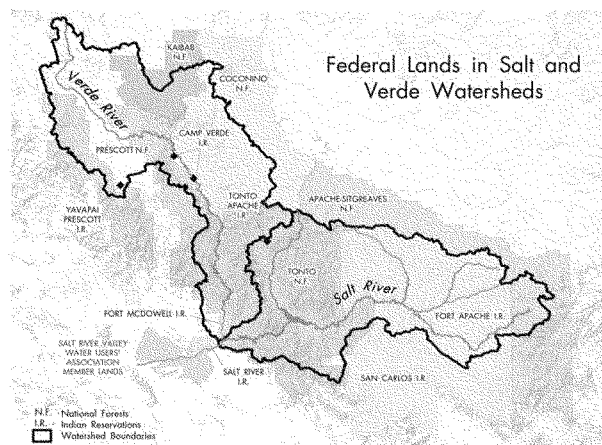
exchange for pledging their land as collateral for the federal loans to construct Roosevelt Dam, which loans have long since been fully repaid, landowners in the Salt River Valley received the right to water stored behind the dam.

SRP now operates six dams and reservoirs on the Salt and Verde Rivers in the Gila River Basin, one dam and reservoir on East Clear Creek in the Little Colorado River Basin, 1,300 miles of canals, laterals, ditches and pipelines, groundwater wells, and numerous electrical generating, transmission and distribution facilities. The seven SRP reservoirs impound runoff from multiple watersheds, which is delivered via SRP canals, laterals and pipelines to municipal, industrial and agricultural water users in the Phoenix metropolitan area. SRP also operates approximately 250 deep well pumps to supplement surface water supplies available to the Phoenix area during times of drought. In addition, SRP provides power to over 1 million customers in the Phoenix area, as well as other rural areas of the State.

SRP Watershed

Since the end of the nineteenth century, farmers and residents of the Salt River Valley have been integrally involved and interested in the management of the Salt and Verde watersheds. Although the Valley's involvement with the forested land has changed over the decades, the

interest has remained constant due to the watersheds' vital role in producing water for the Valley.



In 1891 and 1897, the U.S. Congress passed legislation enabling the federal government to set aside forests to help preserve the nation's water supply for future generations. In 1897, the Arizona Territorial Legislature wrote to Congress and stated, "The forests on these water-sheds [Salt and Verde]... are in great danger of being entirely removed by settlers and

large lumber companies to the great detriment of our water supply." Over the next decade, National Forests were created primarily to protect the watershed above Theodore Roosevelt Dam and to protect the watershed along the Verde River. In 1901 the *Arizona Republican* touted the designations by saying: "Protection to the magnificent forest and the conservation of the waters that feed the Verde and Salt Rivers. The value of this action to the people of the Salt River valley cannot be overestimated." Today, 59% of SRP's 13,000-square-mile watershed lies within national forests as part of a plan to provide a renewable water supply for the Valley. The hydrologic values associated with healthy forests were recognized by the federal government during the early part of the 20th century, and was the underlying reason most forest lands were set aside in Arizona; for the protection of the water supplies used in the Salt River Valley.

Risk & Impact of Inaction

As the last three decades have proven, failure to take action to better manage and restore forested lands have resulted in more and larger fires. The growing size and impact of wildfires on SRP's watershed can be clearly seen in the included graphics. In the 1980's just under 85,000 acres in the watershed burned and a 5,000-10,000 acre wildfire was considered very large. In the 1990's the total acres burned grew to about 227,000, and since 2000 nearly 2 million acres have burned, with two fires alone consuming nearly 1 million acres.

The growing size and frequency of wildfires has clear economic, ecological and human impacts. Fighting and recovering from a catastrophic wildfire can cost up to 30 times more than restoration, and studies done following the historic Wallow fire in Arizona have shown that the total economic impact is quickly approaching \$1 billion.

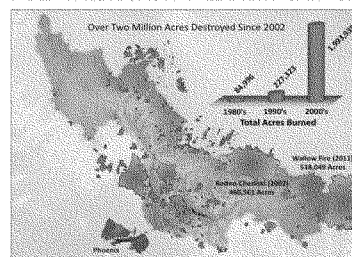
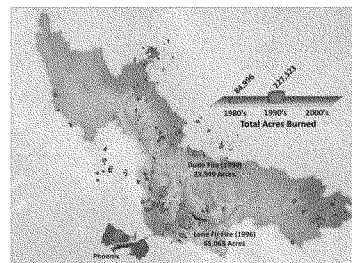
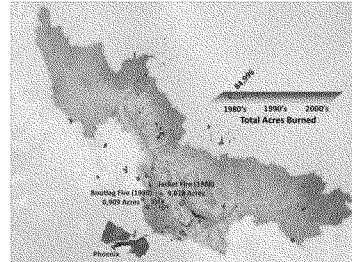
Deteriorating forest health and catastrophic wildfires also impact the hydrologic characteristics of watersheds. Runoff and water yield, peak flows and low flows, erosion and sedimentation, and water temperature and chemistry are all negatively impacted by unnatural forest conditions and severe wildfires.

Water Supply and Storage

Unhealthy forests and catastrophic wildfires affect the short and long term management and sustainability of our water supply. The timing and characteristics of runoff, reservoir storage capability and water yield are being adversely impacted by the state of our forests and the recent megafires that continue to occur on the watersheds.

In Arizona and throughout the west, reservoir storage is a critical component of water supply and drought management. Dams are typically designed to have a specific useful life with storage capacity gradually decreasing as sediment carried by the streams and rivers discharge into the reservoir. Catastrophic wildfires, unlike the low intensity fires seen in healthy forests, cause burn areas that devastate the landscape and produce increased loads of sediment, ash and debris causing reservoirs to fill up faster and reduce the life and storage capacity of reservoirs. The loss of trees and groundcover from wildfire may also affect the timing and behavior of runoff, impacting the predictability and operations of water supply.

Heavily forested and steep walled watersheds have characteristics that amplify the impact of sedimentation due to wildfire. SRP's C.C. Cragin watershed, discussed below, is one such circumstance and is especially at risk of significant decrease of capacity from a single wildfire. In Colorado, wildfires in the watershed that feeds the Strontia Springs reservoir, a reservoir similar in size to C.C. Cragin reservoir, followed by summer rains, washed more than one million



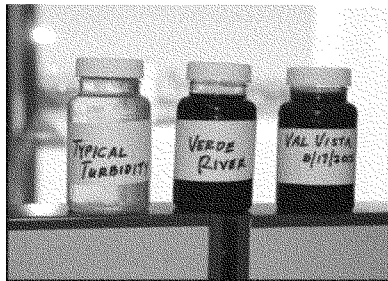
cubic yards of ash and debris into the reservoir. The significant inflow of sediment and debris required Denver Water to spend more than \$60 million in slope re-stabilization efforts, water treatment and reservoir dredging to mitigate the impacts caused by these wild fires.

Forest restoration may also have a positive effect on water yield, however the volume of potential benefit have not been analyzed extensively nor thoroughly investigated from a field measurement perspective. SRP's participation and funding of research efforts and in the field monitoring of precipitation, snowpack and stream flow will broaden community understanding of the connection between forest management in the Salt and Verde watersheds and dependable, high-quality water supplies in the Phoenix area. Together with NAU and the other State universities there will be increased focus on gathering field data and modeling water yield between control watersheds and those that have been treated. Other studies have estimated increases of runoff from 5% - 40% due to restoration, or forest thinning programs. However, the characteristics of each watershed differ in landscape, climate and geology. This study project with the State universities should provide SRP a better understanding of the impacts of restoration on surface water runoff and groundwater recharge.

Water Quality

The water quality impact of catastrophic fire and post-fire flooding has both short and long-term impacts, reaching throughout the watershed, and extending far beyond the immediate impact area of the fire and the surrounding communities.

The ash and sediment picked up by runoff after a fire severely impact the taste and purity of drinking water supplies causing an increase in turbidity, and nutrient and organics loads that must be removed during treatment. Runoff events following fires have also resulted in significant changes in the levels of nitrates, sulfates, chlorides and organics entering SRP's reservoir system. Over the longer term, the increased volume of sediment deposited behind reservoirs due to changes in runoff patterns and soil destabilization can impact the taste and odor as dissolved organics increase in the water.



In situations where fires occur low on the watershed and the runoff from the affected area does not enter a reservoir prior to entering delivery canals, the water quality impacts can be more immediate and severe. One such fire and post-fire flood required SRP to blend water in our canals with Central Arizona Project Water to bring down the particulates before delivering it to water treatment plants, and also required that a large quantity of valuable runoff be dumped without being put to a beneficial use.

The increase in organics and sediment in the SRP water supply from fires and ever increasing water quality standards have directly led to increased capital and operational costs at city water treatment plants. In many cases treatment facilities have been upgraded by adding carbon filtration to handle the increased levels of organics and sediment at a cost of hundreds of millions of dollars. SRP is partnering with our municipal customers to invest in forest restoration projects as a way to improve the health of the watershed and avoid ever increasing treatment costs related to water quality impacts from catastrophic wildfire.

SRP Forest Restoration Activities

SRP is actively involved in protecting the health of the watersheds that serve SRP customers and shareholders, with a primary goal of expediting forest restoration efforts through collaboration, targeted investments and fundraising, project and policy development, and educational programs that show the clear link between the interests of valley cities and businesses and the health of our forests. SRP also continues to invest in scientific research to better understand and communicate the importance of forest restoration treatments on the hydrologic function.

Four Forest Restoration Initiative

Through the nation's largest forest restoration effort, known as the Four Forest Restoration Initiative (4FRI), over 2.4 million acres are designated as needing some form of restorative work to improve the resiliency of the forest.

The Four Forests Restoration Initiative (4FRI) is a collaborative effort to restore more than 2.4 million acres of forests in northern Arizona. The goal is to restore these forests to a healthy state-- reducing the risk of catastrophic wildfire, while promoting functioning forests and supporting a sustainable forest industry that works to keep forests healthy and strengthen local economies. 4FRI is the largest landscape-scale restoration project in the United States, working to restore forested lands in the Coconino, Kaibab, Tonto and Apache-Sitgreaves National Forests. 4FRI is a collaborative effort that centers around the Forest Service working with more than 50 stakeholders to ensure that the multi-purpose nature of these Federal Lands is preserved. Additionally, 4FRI works to re-establish a strong forest products industry in the state—an effort that is essential in performing the restorative treatments necessary to reach the goal of a healthy and resilient forest. The efforts taken by the Four Forests Restoration Initiative are key in helping ensure that the forested lands in the Salt and Verde watersheds are not destroyed by catastrophic wildfire.

The Restoration of C.C. Cragin Reservoir Watersheds MOU

The Town of Payson, US Forest Service, Bureau of Reclamation, the National Forest Foundation and Salt River Project signed a Memorandum of Understanding (MOU) on July 17, 2014. The MOU aims to reduce the threat of severe wildfire in and around the watersheds that drain into the C.C. Cragin Reservoir. The MOU was formed under the Western Watershed Enhancement Partnership program enacted by the U.S. Departments of Interior and Agriculture in 2013. The partnership was formed in response to the need for forest restoration activities to protect the C.C. Cragin reservoir, a water supply to the Town of Payson, Salt River Project and communities in northern Gila County. The area of interest has more than 64,000 acres of ponderosa pine and mixed conifer forests at risk to catastrophic wildfire. The project team is currently working to develop a 5-year action plan which specifies accomplishment targets for planned restoration and protection activities within the project area. The first year of planning is underway, requiring \$378,909 appropriated in the FY15 Coconino National Forest Service budget. The Coconino National Forest has requested \$501,000 be appropriated in FY16 for NEPA planning processes for the C.C. Cragin fuels reduction project.

Northern Arizona Forest Fund

Developed in partnership between SRP and the non-profit National Forest Foundation (NFF), the Northern Arizona Forest Fund (NAFF) was created to provide a funding mechanism for investment in site-specific projects on federal lands that are critical to improving the health and resiliency of forests located within the Salt, Verde and East Clear Creek watersheds. These watersheds provide surface water supplies and other important natural resources to SRP's

customers, shareholders, and municipalities. With declining forest health and tighter federal budgets, leveraging public-private partnerships is critical.

The NAFF's projects focus on reducing wildfire risk, improving streams and wetlands, enhancing wildlife habitat, and minimizing erosion and sedimentation that can affect Arizona streams, rivers and reservoirs. NAFF's first year projects include two high-priority projects in the Verde Watershed; The Oak Creek Erosion Control Project and the Upper Beaver Creek Forest Health Project. Together, these projects will protect over 1000 acres of forested critical habitat for the Mexican spotted owl and improve conditions of over 20 miles of forest roads which minimizes sedimentation into the Oak Creek Watershed.

Along with SRP and NFF, Valley stakeholders, businesses, philanthropic groups and cities are committing to their engagement in the NAFF, improving the resiliency of the Salt and Verde watersheds – especially addressing the threats of fire, insects, drought and a variable climate. At the same time, SRP through the NAFF is providing certainty to our shareholders, while building capacity and awareness of the critical link between our forests and the long-term sustainability of the Valley's water supply.

Opportunities to Accelerate Forest Restoration

In Arizona as in many western states, there is a deep body of science that clearly demonstrates the need and benefit of thinning projects in overgrown forests, and important partnerships between academia, local stakeholders and conservation groups, and the federal, state and local governments that are working to translate the science into action. However, despite the strong coalition and engagement from a diverse set of interests, limits on USFS resources and capacity, litigation driven decision making, and lengthy environmental compliance requirements are slowing progress on forest restoration. Congress should consider a number of improvements to current law that reflect the urgency of action in our forests and rebalance the level of environmental analysis based on the risk of wildfire and severity of impact on ecosystems and habitat.

Fire Borrowing & Project Administration

As has been discussed, the growing cost of USFS fire suppression activities is negatively impacting the budget available to carryout critical restoration projects that protect forests and will begin to reduce firefighting costs over the longer term. SRP supports the FLAME Act Amendments of 2015 (S.508), but also recognizes there may be other potential structures that would address the "fire borrowing" issue. In order to provide the confidence necessary to encourage the private sector investments needed to repair our forests, it is important that the final solution provide budget flexibility to prevent the fire suppression spending from cannibalizing the budget for other USFS programs and provides assurances that increases in budget authority will provide dedicated and sustained funding for forest restorations programs. It is important to SRP that any increased funding or budget flexibility is directed toward restoration programs first to not only protect these federal lands but as an upfront investment to decrease future suppression costs.

Providing greater flexibility for stakeholders partnering with the USFS on specific projects to pursue opportunities for contractors to conduct portions of the planning, compliance or implementation process is another way to improve the resource and capacity issues faced by the agency. In addition, empowering project partners to play a greater role in the execution of this work could have the benefit of addressing the challenge associated with changing agency personnel and leadership at the forest level. Specifically, giving project partners some formal role in affecting which authorities and established processes the Forest Service uses to

undertake thinning work could allow for best practices and success stories to be replicated in more projects.

Environmental Compliance

Conducting the extensive analysis and administrative steps needed to comply with the National Environmental Protection Act (NEPA) and Endangered Species Act (ESA) commonly takes multiple years and is often required prior to undertaking any work to reduce fire risk. While in some circumstances Categorical Exclusions can accelerate work on a limited number of acres, an EIS is typically required for projects of the scale necessary to significantly mitigate fire risk on watersheds. In order to accelerate forest restoration, some level of compliance streamlining is needed.

The C.C. Cragin watershed project discussed above is a good example of a project of critical priority – where the landscape is highly susceptible to a catastrophic wildfire and the impacts would severely impact a municipal water supply – but the environmental compliance processes is expected to take 2 years before hazardous fuels reduction activities can begin on the ground. That will leave the endangered species, ecosystem, and water supply vulnerable for two fire seasons, despite the known risk of delaying action for this length of time. While it is important to take reasonable steps to ensure that thinning projects avoid impacting endangered species and sensitive habitat, the current process prioritizes analyzing any potential impact over protecting against the certainty that a single unlucky lightning strike or cigarette can destroy the entire landscape.

One step that would be valuable in accelerating compliance is reassessing the basis in which Categorical Exclusions for forest restoration activities are granted to include the likelihood, intensity and effects of wildfire on wildlife and ecosystem function - factors that are being assessed as part of the USFS Wildfire Risk Assessments. These factors, as opposed to the size (in acres) of a project, are a better determinant of whether fire presents a greater risk to the environment than inaction. Additionally, limits on the intensity of thinning (i.e. hazardous fuels reduction v. full restoration) could also be a more appropriate assessment of potential impacts than simply the size of a project.

Another policy change that would improve the compliance process for treatments requiring a full EIS is allowing projects designed to mitigate fire risk on watersheds highly susceptible to catastrophic wildfire to analyze zero or one alternative no matter which existing authority the project partners utilize to undertake the work. This process authorized as part of the Healthy Forest Restoration Act has been useful where it applies, but expansion to allow it to be used on the most vulnerable landscapes could reduce the length and complexity of NEPA compliance.

Judicial Review

Litigation is often the cause of lengthy delays in forest restoration projects that increase the risk of catastrophic wildfires. Clearly changes to judicial review procedures can be contentious, but given the risk and impact of a catastrophic wildfire, a higher standard should be required to stop or delay projects in the most critical areas. Additionally, the constant threat of lawsuits often forces USFS staff to be more focused on process than on the risks and needs of the forest. In order to begin improving the functionality of the dispute resolution process to better align with the urgency of forest restoration, Congress should consider moving toward a process focused on an acceptable middle ground based on impacts and risks.

As has been discussed and proposed, a positive approach that would place a premium on timely resolution to and constructive engagement on disagreements is instituting binding

arbitration in place of litigation on certain forest restoration projects. Limiting legal standing to entities that are directly impacted by the project in question and/or have registered an interest in the project during the scoping and public engagement opportunities would also provide for a process geared toward finding consensus on what work can be undertaken quickly rather than obstructing progress on all actions regardless of whether they have broad consensus.

Conclusion

The continued value of our National Forests in providing wildlife habitat, ecological protections, clean water supply, recreational opportunities, forest products and healthy rural economies depend on accelerating restoration and hazardous fuels reduction. Restoration also results in significant carbon sequestration in certain forest types, which has a positive environmental benefit and may present an additional revenue stream to fund forest thinning. SRP and multiple partners in the conservation, forest products, academic and government sectors remain committed to taking every step possible as quickly as possible to treat and protect Arizona's forests. Thank you again for the opportunity to testify before you today and for your continued efforts on this critical and timely issue.

The CHAIRMAN. Thank you, Mr. Hallin. Thank you to all of our witnesses here this morning. As I mentioned after the Chief's testimony, I think we would all agree we have to figure out how to stop this fire borrowing because when we are talking about how we deal with treatment, how we work to mitigate the risk here, it takes dollars. When you spend all of your dollars on suppression, it does not leave much room for further treatments.

The concern here is that these suppression costs are out of control. Chief, I know you are very supportive of a wildfire cap adjustment, but from what we have heard from just about everybody here this morning, it is not necessarily the silver bullet to address the skyrocketing costs of wildfire suppression spending. How we deal with that is something that I would like to focus on this morning.

Both you, Mr. Hallin, and Mr. Eisele, to a certain extent, have described the hazardous fuel reduction projects that are critical to protecting whether it is the watersheds that you have noted, the Cragin Watershed or other areas there. The comment that you made, Mr. Hallin, that we know what it is that we need to do and yet we can't get to that point, and it takes two to possibly three years to implement these projects. We talk a lot about analysis/paralysis around here where we have endless process. Again, we hope that there is not going to be a lightning strike that is going to bring about disaster. Chief, can you speak to this? I mean, are we in a situation where we are more worried about checking the boxes in making sure that we have gone through a critical process or are we acting with a level of urgency that I think you have heard from everybody here at this table with regards to these critical projects that will help us from the preventive perspective? I think we would agree that if we can prevent these in the first place we can get a better handle on these suppression costs. What is our problem with the process that seems to be slowing things up when we are dealing with treatment of hazardous fuels?

Mr. TIDWELL. Madam Chair, one of the issues we dealt with in the past is needing to do a large enough project where it actually makes a difference, and that's where we've moved to taking a more landscape-scale approach.

In the past the Healthy Forest Restoration Act, which you passed a few years ago which gave us the streamlined NEPA process, was a very good tool. The problem with that is that it was limited to certain criteria. And so when we looked at larger landscapes we could use that authority on a piece of the project but it wouldn't apply to these tens of thousands of acres.

Now with the Farm bill authorities with insect and disease it gives us some more flexibility to be able to use that approach looking at just one action alternative and a no action so we can streamline the process.

But the key is——

The CHAIRMAN. Let me ask you about that if I——

Mr. TIDWELL. To look at these larger landscapes.

The CHAIRMAN. Let me ask you about that because when we were going to vote Senator Stabenow, who is not able to return back to the Committee, raised this issue with me saying that in the Farm bill there were additional authorities that were given to do

just exactly as you have said. Are these additional authorities being utilized at this point and are they making a difference?

Mr. TIDWELL. We're beginning to utilize, especially the CE authority in the Farm bill. We have projects that are going forward with that. And you'll see, especially in FY'16, many of our projects we'll be implementing will be using these new authorities. But we often take a year of planning and going through NEPA before we implement, so you'll see those projects being implemented in '16.

The CHAIRMAN. I think that has been the concern here is that we have got this process that we have to go through. Is this what you were speaking to Mr. Eisele and Mr. Hallin? Is there any way to expedite that, in your view? You know what you have to do.

Mr. HALLIN. One of the difficulties that we've had with the Cragin Watershed, we do appreciate the opportunity to utilize the Healthy Forest Restoration Act as an alternative to full scale restoration. We would prefer full scale restoration, but at this point we decided to move forward with the Healthy Restoration Act.

The Forest Service personnel have over 25 years in understanding the types of fires that have occurred on this watershed where the endangered species are located and the extent of the watershed itself on those areas that are highly susceptible to wildfire risk. The problem is they have to go through an entire EIS process that essentially is designed, from what I gather in watching staff, is designed to essentially avoid litigation.

We know what the issue is, we know that these forests need to be thinned, we know that the greatest threat to the species that the EIS is designed to protect is catastrophic wildfire, but unfortunately we have to go the same process another two years before we can ultimately get in there and thin those forests.

The CHAIRMAN. Yes, we hear this story so often that what we are attempting to do is to avoid litigation and in the meantime lightning strikes and we are paying the cost.

Senator Cantwell?

Senator CANTWELL. Thank you, Madam Chair, and again, thank you to the witnesses.

Dr. Hood, thank you for your testimony, and thank you for your work in this area. It is very important.

Your key point was about the fact that thinning and prescribed fire created the most long term resilient forest to future disturbances, so I want to drill down on that because I think that is a culmination of your conclusions which is very important in looking at all these options.

Chief Tidwell, your testimony stated that the Forest Service has identified about 12 million acres that really need hazardous fuel reduction treatment, but the budget year after year only requests about \$300 million for those treatments. Is that sufficient funding for those highest priority areas and what do we need to do to get a more realistic number? Sorry to put all this out there, but that is the best way to get all the answers we need and some of them you can give me in writing too.

Secondly, regarding this whole issue of, you know, do we have the best communication that we need for communities during these fires? Do we need more coordination with FEMA? Should FEMA be a permanent part of the incident command team? What can we do?

Do we need to get an MOU, memorandum of understanding, between you and FEMA to ensure you can communicate while with the community responsibilities—you are busy fighting fires? If the communication infrastructure does not exist anymore, then how are we making sure that we do not have to wait two weeks to communicate about the ongoing crisis, given the level of huge fire increases that we are seeing?

Third, does your agency have a permanent agreement with the FAA on an application with them on drones? I would like to see this not be an issue where every state that has a fire and then wants to know whether the drones can be deployed to get a better understanding of the fire or mapping or what have you. I would just like it to be a natural course between the Forest Service so that we do not have delays, because I think they are providing us very, very vital information about these fires.

Mr. TIDWELL. I'll start with the last question there.

We're working very closely with FAA to be able to use the unmanned aircraft to be able to collect the information, and we have a team that's gone, put in place this year to be able to explore.

The challenge for us is to be able to understand what information we need and when we need it so that because the potential there is there's so much data that's available, but we've got to be able to prioritize it so we can quickly be able to use that. So we're going to be moving forward this year. We'll be working, not only with FAA, but also with the states to work very closely to be able to start to use this information, probably simply mapping is one of the simple and looking for hot spots, especially outside the line where we've had success in the past.

Senator CANTWELL. But you'll do a permanent application so you won't have to keep going back and forth all the time?

Mr. TIDWELL. Well, we're going to be working in that direction so that it's automatic.

Senator CANTWELL. Thank you.

Mr. TIDWELL. And that under these conditions we can use the aircraft.

Your question about what happened with the aftermath there or even during the Carlton Fire—it really stresses how we need to do a better job with our preplanning. We do a good job and work with communities so they're ready for the fire, but based on that experience we need to do a better job to also deal with things like communications. The things that we need to make sure communities have an emergency communication system that's in place so that when that happens that those, whatever it takes, that we're going to be able to maintain communications.

From when I was up there visiting with the homeowners, especially, one of the things they stress is that they didn't know. They didn't know what was going on. They had no way to contact anyone, I can't imagine that level of stress that would come from that situation, so it's one of the things that we've learned. We need to get that in place.

We need to actually do a better job than we have been with utility companies. They're always great to step right in and ready to roll, but we need to include them also in our preplanning meetings. So that when the next Carlton happens, yes, we'll have the fire to

deal with, but at the same time we can provide a higher and better level of support to those communities to be able to eliminate some of the impact and get their services restored faster.

Senator CANTWELL. Does FEMA need to be a permanent part of the equation?

Mr. TIDWELL. Yes, FEMA definitely needs to be working with us. They are a part of the solution, and we'll continue to work with them.

Senator CANTWELL. I just want to point out for my colleagues, because this is after 149,000 acres burned, the Winthrop/Twist Valley area was without communication and yet fires were still all around them.

Mr. TIDWELL. Yes.

Senator CANTWELL. Without any communication because the broadband burned up, no one had any way to communicate with people other than, as I said, trying to go through the town. I think this and Oso taught me that we need—

Mr. TIDWELL. Yes.

Senator CANTWELL. Communities need to be able to get a mobile, broadband unit more easily deployed as opposed to waiting for two or three weeks for the state to apply for a FEMA declaration.

If this is all about who is going to pay for this in the end and we are hesitating, our constituents are without the vital communications in a disaster. If this is what we are seeing because of the impacts of these drastic events because of weather, I think we need to look at these events and say we need better communication response in the aftermath and to figure out how to do that for these communities.

So thank you, Madam Chair.

The CHAIRMAN. Thank you.

Senator Daines?

Senator DAINES. Thank you, Madam Chair.

Chief Tidwell, let me first start by saying I share your support for a solution to the wildfire funding challenge. I have spent a lot of time traveling across Montana hearing from conservation groups, sportsmen groups, the timber industry. I think we have a great, broad spectrum of agreement that something has to change in the way wildfires are funded or wildfire fighting is funded, and I am hoping that we resolve it this year. I am going to do everything I can to make that happen.

Your office provided me information that indicated over seven million Federal acres in Montana are at high or very high risk of wildfire, most of which are managed by the Forest Service. That is approximately one in four Federally-controlled acres in Montana. I was further told that nearly two million of these acres are most in need of treatment because they are near populated communities or watersheds.

Unfortunately I was informed that the Forest Service did hazardous fuels treatment on only about 52,000 of those acres in the last Fiscal Year out of two million that are needed. I have no doubt that the work that was done there was important, but the current pace of treatment is simply not acceptable. Certainly our communities, our watersheds, our wildlife habitat, our access to recre-

ation, all of these critical Montana treasures are at real risk to wildfire.

More than ten years ago Congress provided enhanced authorities to the Forest Service to reduce hazardous fuels through the Healthy Forest Restoration Act (HFRA). You mentioned that, but as noted these authorities are clearly not adequate and the HFRA clearly has shortfalls. What, in your view, are the barriers to getting more done there?

Mr. TIDWELL. Well as I shared earlier the Healthy Forest Restoration Act continues to be a good authority for us, but it is limited to certain areas based on the criteria that's required and that is having community wildfire protection plans. You need to have a hazardous fuel component. And we really need to be looking at the entire landscapes, the full restoration work, not only the hazardous fuels work next to the community, but what we need to do in the entire watershed. And as we pointed out from, you know, some of the witnesses that is a much better approach.

And so we look at Healthy Forest Restoration Act and now with the new Farm bill authorities that allow us to be able to use the similar type of NEPA approach, but also address where it has insect and disease. By putting those together it's going to allow us to take more of a total landscape approach to be able to look at everything that needs to be done on that landscape and to be able to look at not thousands of acres, we just have to be looking at tens of thousands to hundreds of thousands of acres at a time. And to be able to have the NEPA in place so for the next ten years we can be able to get in there and do the work that needs to be done. Those are the things that are really going to make the difference.

Senator DAINES. Well, I truly appreciate your commitment to finding solutions that will improve forest health and also increase responsible timber harvest in Montana, and we really look forward to further discussions with you to achieve that goal.

I want to ask Dr. Hood a question. Dr. Hood, first of all welcome to our nation's capitol. It is good to have another Montanan in the room, and it is great to have the perspective of someone who intimately knows the challenges facing our national forests in Montana.

Your testimony focused largely on the role of fire and the role of fire management on increasing resistance of the bark beetle. I remember seeing this when I was a kid back in the 70's, and now we are seeing it again and my children are seeing it now in Montana as well.

I know your research was primarily focused in the Rocky Mountain region, but as you know Montana has millions of acres that are damaged by beetle kill. I am pleased that Congress recently gave the Forest Service new authorities to tackle this huge challenge in Montana. Based on your research how could increased management, including thinning and prudently removing dead timber, be used to improve the health of forests in Montana and reduce the risk of catastrophic wildfire?

Dr. HOOD. So in order to increase the health of our forests thinning should be a valid or a good management tool.

My research also showed that having prescribed fires and low severity naturally occurring wildfires stimulates tree defenses. So

having that combination of thinning and prescribed burning and then areas that we have treated to allow, naturally, allowing to consider allowing ignitions to burn, allow fires to burn, further perpetuates a healthy forest that could be resistant to bark beetles.

I think we're always going to have some level of bark beetles. They're native insects to our forests, but having/doing such treatments and promoting a patchy landscape can certainly help reduce the severity of those outbreaks.

Senator DAINES. Thanks, Doctor.

The CHAIRMAN. Senator Franken?

Senator FRANKEN. Thank you, Madam Chair.

Chief Tidwell, you and I have talked before about the role of climate change in all of this, and we have talked about the removal of hazardous fuel as we have been talking about today in different ways.

One of the ways that I think that we could, possibly, and I want to ask anybody about this, to remove more hazardous fuel and be able to do it in a way that it costs less is by monetizing that biomass. By monetizing it, by using it, burning it, to create electricity and in combined heat and power which is something that the Chair and I have talked about. There is a lot of, obviously, areas in Alaska where this hazardous fuel, after all biomass is, as we can argue, is zero carbon footprint, we can solve a lot of things at the same time.

There is obviously a lot of challenges to this in terms of remoteness and moving the stuff and using it, but we are talking about the wildland urban interface so there are, obviously, areas where this is near/in a populated area. What are some of the challenges standing in the way of more utilization of this tremendous resource, and this is for anyone, and what are your recommendations for overcoming these challenges or are these challenges?

Mr. TIDWELL. Well I'll start, Senator.

You know, the challenge is to be able to demonstrate that it's economically viable. And so to be able to create these markets and we need to continue to make the investments to help people to do the business case analysis before they make the investment. We need to continue to use our authorities like the BCAP Authority where we can subsidize, actually, the transportation of this biomass material to a facility, and to be able to get more and more demonstration projects.

At the same time we need to continue our research, not only to increase the efficiency of these systems, but also for things like with pellet production to be able to find a more efficient way to develop a pellet to increase the BTUs to increase the economics on it.

I think we also need to just factor in the consequences if we don't. What's this cost avoidance? And if we could ever capture a way to really consider that, I think it would really help with the economics of this.

If we think about by thinning out these forests the reduction of risk that's occurred and then by being able to use the material for either to use it into a wood product material or for energy consumption. If we could factor in the cost avoidance benefit on that, I think that the economics would sell itself on this.

But we're going to have to continue with our research, continue with demonstration projects and to be able to also have a guaranteed supply of biomass. If you're going to make an investment, you're going to need to have the bank loan money. And so we've got to use more of our stewardship authority where we can show that's a ten year contract. And you can take that to the bank that without any question material is going to be there. So those are some of the things we need to continue to work on.

Senator FRANKEN. I agree with you, and I think there is a cost to not doing this. Are we doing the pilot projects? Are we exploring this enough? And do we need to do anything here in this Committee and in Congress to facilitate overcoming this challenge so we can do something, especially with energy storage and the more use of distributive energy? How we can make this a piece so that you will have the ability to remove hazardous fuel because it is monetized so we can do more of it and make it make sense? Anybody? Yes, Mr. Hallin.

Mr. HALLIN. Thank you for the question, Senator.

At Salt River Project there is a biomass plant that we actually buy half of the power at that facility. One of the challenges, as Chief Tidwell mentioned, was the fact of ensuring that you have material at that plant so we don't need any undue delays to ensure that there is material available at the biomass plant. I think, second, there's another added value benefit. By going in and thinning these forests there's essentially an avoided release of carbon. When you have these catastrophic wildfires there's a major release of carbon into the air.

Senator FRANKEN. Sure.

Mr. HALLIN. So there's another benefit associated with utilizing.

Senator FRANKEN. Better to release it as energy that we use for electricity rather than just go up into the atmosphere.

Mr. HALLIN. Yes.

Senator FRANKEN. Yes.

Okay, thank you, Madam Chair. I really want to continue. Every time you testify I bring this a little bit further, but I really want to keep exploring that and especially with the Chair.

The CHAIRMAN. Thank you, Senator Franken.

Senator Flake?

Senator FLAKE. Thank you, Madam Chair.

Thank you for the testimony. It is nice to have a couple of Arizonans here. Dr. Pyne and Bruce, it is good to see you. I know we have talked on a number of occasions, and I appreciate the testimony from those who know so much on this.

I appreciate the work of Chief Tidwell. I think it is important to acknowledge some of the positive developments that we have seen recently related to forest management. Last month I think all of us were encouraged to learn that Phase One, 4FRI, the record of decision was signed. That will allow us, the Chief talked about, large scale management rather than just a couple of thousand acres here or there, the paltry 3,000-plus acres that have so far been treated is emblematic of the pace that we have that is simply too slow. We have to do it on a much, much larger scale.

Chief, you have noted, 58 million acres, are at high or very high risk. We have to move on a larger scale, so we all recognize achiev-

ing reduction in hazardous fuels is critical. And we have got to find a way to solve this fire borrowing issue. I like some of the proposals that have been put forward. Myself, Senator McCain, Senator Barrasso, and others have put forward some as well.

By way of disrupting these activities, in terms of suppression, we are putting hazardous fuels reduction on hold. We are also putting communities and fire fighters at risk as we know all too well in Arizona. As Bruce talked about today, we are also increasingly creating challenges for maintaining a healthy watershed and for what that does to drinking water supplies.

For all these reasons I am, obviously, supportive of efforts to resolve the fire borrowing issue by allowing a limited adjustment to statutory budget caps under specific circumstances or scenarios. For example, when the Forest Service and DOI exceed anticipatable or those that we can forecast, wildfire suppression costs. There is no doubt that wildfires are disastrous. They have a tremendous impact on communities that derive their livelihood from the national forest on water quality and on wildlife. But we cannot let the disastrous nature of wildfire make us lose sight of many of the costs of fighting fires and that we can't anticipate them.

Let me be clear about that. Many of the costs of both preventing as well as fighting fires can be anticipated like municipal fire departments that budget for expected personnel and incident response costs. I believe that we can do much the same here. I would agree on the significance of the problems that wildfires present, but where there is some disagreement is dealing with these so called anticipatable costs.

I would support efforts to recognize that in some years there will be large fires that drive the wildfire suppression costs well above those that were anticipated. In those years if the agencies have been appropriated 100 percent of the anticipated costs, I think that limited budget cap adjustments to allow the agencies to fight fire without borrowing from other sources would make sense.

If they have been fully budgeted for what is easily anticipated as a realistic cost of suppression then that would apply. Frankly I would like to see sufficient funds on the front end. I think we all would like to see that put into suppression activities as well. Sound budgeting requires dealing with both preventable symptoms as well as resulting disasters.

What I disagree with is the notion that we should simply move 30 percent of those anticipated costs off budget because it is convenient nor because it creates additional flexibility for increased spending under the statutory budget caps, paying for one disaster while furthering our current fiscal disaster does not make sense. We need to be realistic here about what we can do. We need to deal with the House as well, and be realistic about what we can budget for and what we can't.

There is a solution to be found on the issue I believe that involves flexibility but only after 100 percent of those anticipatable suppression costs have been expended. Let's not confuse disasters with unanticipated costs. We need to plan for what is likely to occur to take steps necessary to prevent those disasters from occur-

ring, and then use flexibility in those rare years where we go over those costs.

I hope that my colleagues and the Administration will come together and find a solution, a long term solution, on this issue.

I did not want to use all my time speaking here, but I believe I have. So thank you, Madam Chair.

The CHAIRMAN. Senator Flake, I think this is a key part of what this Committee will be grappling with is exactly how we deal with this. I, too, hope we can find that agreement here, but we have to be realistic in terms of what we are facing and it has to be a solution that is more lasting than what we are dealing with right now which is, kind of, an interim stop gap and again, borrowing that hurts everybody. So know that we will be working with you on this.

Senator Heinrich?

Senator HEINRICH. Thank you.

Chief, at the beginning I think you apologized for bringing up fire borrowing. Once again, I think, most of us up here would say don't apologize and keep bringing it up until we find a workable way forward on this because it is, sort of, the elephant in the room here. We have to fix that piece of all of this one way or the other to be able to really scale these projects up to the kind of landscape levels that you were talking about.

Mr. Hallin, I wanted to ask you if you would go into a little more detail about the kinds of projects that you are doing and the partnerships. I know in New Mexico we started to look at this, so we have a couple of different things going. One in the Santa Fe watershed, the Santa Fe water fund which uses contributions from water users to match up with Forest Service funding and treat the watershed above Santa Fe. In addition the Rio Grande water fund is now doing a similar partnership on a much larger geographic area of the Rio Grande's watershed, south of Colorado in Northern New Mexico.

If you would tell us a little bit more about those partnerships and how we might be able to learn from those things and scale them to other regions to get some of those benefits that we see when we are able to connect downstream water users effectively to the health of their watershed which may be hundreds and hundreds of miles away.

Mr. HALLIN. Thank you, Senator, for the question.

We found very quickly that there was a definite disconnect with many of the businesses and water users in the valley. And when I'm talking about the valley, the Phoenix metropolitan area disconnect between a healthy forest and a healthy watershed. To begin getting the subject matter to a broader base group of individuals we decided to work together with some of our larger power customers and other customers that receive energy from SRP. Many of those organizations have green initiatives and other initiatives that if they're looking at spending money to improve, not only their products that they're delivering but also to improve their image.

We sat down and realized that there are opportunities within our watershed to link this issue with end users, so we established this Northern Arizona Forest Fund together with the National Forest Foundation. Now the National Forest Foundation is congressionally

authorized to use private funds as a 501(c)(3) organization. We didn't want end users to think that there was something in this for the Salt River Project. It's actually something in it for the watershed.

So this Northern Arizona Forest Fund, essentially, we identified projects and partnership with the Forest Service that are outside of these large, full scale restoration projects, but they're smaller projects that have a begin date and an end date so that when you invest your money, you know specifically what you're investing in as a result of that project.

Senator HEINRICH. I think that is really key. Connecting up these users who do not or have not in the past had an intuitive connection to where their water comes from. In Santa Fe's case, they can actually see their watershed. But for someone, say, in Albuquerque or in Phoenix, that watershed may be a long way away and connecting those things together is a pretty powerful tool.

Chief, I want to just ask you a quick question with my remaining time. We heard a lot from Dr. Hood about the benefits of using these treatments together if not just having stove pipes around, mechanical treatment and then prescribed, low intensity fire but using them in combination having by far the best results. Are you able to do that as you scale up these landscape level fuel treatments? Are you able to plan both the prescribed and natural fire piece and the mechanical thinning piece together in concert?

Mr. TIDWELL. Yes. A lot of places it's necessary for us to have at least two entries into these areas. So the first year we'll come in and do the thinning.

Senator HEINRICH. Right.

Mr. TIDWELL. To reduce the total biomass and then follow it up, you know, with prescribed fire. And that is the right approach, especially in our dry forest types. And then once you have that thinning done, then you can continue to run that fire through there, either prescribed fire or with our natural fire.

Senator HEINRICH. Right.

Mr. TIDWELL. But often we need to do that mechanical treatment first, the timber harvest, to reduce the stand down to a level of biomass that we can then handle when we do have a fire.

Senator HEINRICH. And probably a more historical level, at least within the Ponderosa Pine dry forest of the West.

Mr. TIDWELL. Yes.

Senator HEINRICH. Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator Heinrich.

Senator BARRASSO?

Senator BARRASSO. Thank you, Madam Chairman.

Chief Tidwell, as a doctor I appreciate the adage that an ounce of prevention is worth a pound of cure. I am concerned with the ever increasing need to fire borrow money from fire prevention activities in the declining health of our national forests. The Administration seems intent on wanting more money for a fire cure while refusing to engage, I believe, in any serious land management fire prevention reforms. The Administration is set on maintaining the failed status quo policies and the culture of litigation surrounding forest management. As I said to Under Secretary Bonnie last month, the Forest Service has, I believe, lost its direction and its

purpose. The Forest Service has become a bureaucracy of bureaucratic agency emphasizing internal processes over real results and improvements on the ground. It is my view that if we are going to increase fire prevention activities that Congress needs to direct and mandate results and outcomes.

Does either the Administration proposal of S. 235, the Wildfire Disaster Funding Act, contain language guaranteeing that funds actually go to prevention activities such as hazardous fuels reduction and does either proposal contain the language providing legislative reforms aimed at streamlining active management and reducing litigation?

Mr. TIDWELL. No, it only eliminates the need to transfer and eliminates the stoppage of work in the fall.

Senator BARRASSO. I look at this and say we must prevent the practice of fire borrowing and prioritize funding for treatment activities to reduce future wildlife suppression costs. That is why I co-sponsored Senator McCain's bill, S. 508, the FLAME Act amendments of 2015.

I think we also have to streamline the way forest management activities are approved, meaningful policy reforms. S. 508 also includes innovative ideas like arbitration to get the Forest Service out of the courtroom back into the forests. We need to solve the challenges facing our national forests in a financially responsible way. Is the Forest Service willing to work with this Committee and the sponsors of the different bills to find solutions?

Mr. TIDWELL. Senator, we're, of course, very interested in working with the Committee to find those solutions. And as we've discussed in the past, this concept of arbitration, it's something that I'm interested in trying. I'd like to see us take on a pilot approach on to that, and part of that is I need to see that it's a better solution. It sounds good in concept, but I really think we need to, kind of, move into that, do some pilot approaches and just to see where that can take us. But I think it's one of the things we want to continue to work with you on.

Senator BARRASSO. Mr. Hallin, so often those who oppose active management of our forests claim hazardous fuel projects, timber production or thinning activities will destroy watershed health and wildlife habitat. Your testimony paints a different picture of what is threatening watersheds, wildlife and the sustainability of high quality drinking water.

In your view what are the primary roadblocks to improving watershed health and wildlife habitat?

Mr. HALLIN. In our experience to date it's been partially the process associated with NEPA. If we can find opportunities to accelerate NEPA we see that as an opportunity to move more rapidly forward.

I think secondly, too, there is a need, and we're seeing this begin to change when it comes to the attitude of the Forest Service that to be in the project management business, to manage those forests and to refocus their efforts on the reason why many of those forest reserves were created, essentially, to protect the water supply.

Senator BARRASSO. Mr. Eisele, thinking about your professional career, one of your responsibilities was to protect and improve watersheds. You described the National Environmental Policy Act,

NEPA, as a weapon in the hands of a few. In your testimony you talk about the amount of time it is taking to complete the Santa Ana Watershed Environmental Impact Statement. I think you said it took over three years to undertake an action that is prudent and necessary for economic health and the protection of life and property is a misapplication of the intent of the law. How often do you see NEPA being used as a weapon or a barrier to actually improving watershed health?

Mr. EISELE. I think it's common. It's a long process and the whole deal is to avoid litigation from people that are obstructionists, in my view.

Senator BARRASSO. So in your view if we do nothing, what are the consequences of, you know, what is happening with fires then?

Mr. EISELE. Well to do nothing is catastrophic fires and continuing catastrophic fires and having unhealthy forests and all the other things we've talked about today.

Senator BARRASSO. Thank you.

Thank you, Madam Chairman.

The CHAIRMAN. Senator Hirono?

Senator HIRONO. Thank you, Madam Chair, and thank you all for testifying.

I wanted to note for the record, Madam Chair, that Hawaii has a fire problem also. It is estimated that 0.5 percent of land in Hawaii burns each year, a percentage that is equal to or higher than what is experienced in Western states. Given that Hawaii's native ecosystems are not fire adapted, we are losing an alarming amount of native flora and fauna to wildfires often to be replaced by non-native grasses and other invasive species that then fuel future fires. In fact, the non-native grasses and shrub lands cover some 24 percent of Hawaii's land creating landscapes that are flammable and highly susceptible to wildfires, so clearly this issue touches every single state.

Chief Tidwell, you talked about the Healthy Forest Restoration Act. It sounded as though you have thought about making some or asking for some amendments to this law that would enable the Forest Service to, as you put it, take a total landscape approach, not just looking at thousands of acres, but to be able to look at tens of thousands of acres. Do you have some suggestive language that would provide more flexibility for the Forest Service to deal with this problem?

Mr. TIDWELL. Well Senator, with the passage of the Farm bill and thank you, again, for the 2014 Farm bill, it did expand the use of the Healthy Forest Restoration Act to deal with these insect and disease. So if you combine that authority plus what we have with the original Healthy Forest Restoration Act, it does really expand on our ability to use that more efficient NEPA process on much larger landscapes. One thing that may be helpful is if we just had one authority instead of the two so that would be a little, I think, a little easier for folks or communities to understand.

The thing I want to stress is that the reason we are able to get more and more work done each year is the level of support we have through these collaborative efforts. And it's been mentioned with the panelists here, we need to be looking at not just a hazardous fuel issue, but also the total restoration projects, the work that

needs to be done to restore the overall watersheds, reduce the hazardous fuels and create this resilient system.

So it's essential that we always recognize that need to be able to have the engagement with our communities, but being able to really reduce the number of alternatives that we need to address definitely speeds up the process and it keeps everybody at the table and allows us to get the work done sooner.

Senator HIRONO. So are you saying that with the combination of the Farm bill provisions and what you have under the Healthy Forest Restoration Act that you have enough authority but it would be clearer if we could put it all in one—

Mr. TIDWELL. It's one way just to simplify it to make it easier for, you know, the public to understand and that we have both of these authorities and now we can use it on a larger landscape. So it's one thing that we're thinking about if that's something that would really help us. But we've had some discussion on it.

Senator HIRONO. You talked about the need for collaborating with communities across the board. Do you have a state-by-state program or plan that would enable communities and fire departments and the state and counties to work collaboratively with the Forest Service to prevent these wildfires?

Mr. TIDWELL. We—

Senator HIRONO. We have something for Hawaii.

Mr. TIDWELL. Yes. In the past we've done it more community-by-community with communities that developed a Community Wild-fire Protection Plan. Now with the cohesive strategy that we've just put out, it allows us to take a much larger landscape approach. So it recognizes not only do we need to have fire adapted natural communities so we have these restored, resilient forests, but we also need to have fire adapted human communities so that we're taking the actions around people's homes and on private land so that we're working together to reduce this threat. These two efforts along with the need to keep the suppression resources we have is really going to be, I think, very helpful for us to be able to move forward and address this problem that goes way beyond just the Federal land.

Senator HIRONO. Chief, I am sorry I am running out of time, but you said that you work community-by-community? Are you working with any particular communities in Hawaii? You can get back to me.

Mr. TIDWELL. I'll have to get back to you on it.

Senator HIRONO. Thank you.

Mr. TIDWELL. But the point that you raised about the invasives that you're dealing with in Hawaii, I mean, that's what we're doing with so many states. It's what comes in after these fires, and so I appreciate you bringing that forward that you also, your state also deals with this issue. We'll get back to you with the list of communities we're working with.

Senator HIRONO. We are basically the invasive species capital of the country. [Laughter.]

Mr. TIDWELL. Yes.

Senator HIRONO. Thank you.

Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator Hirono.

Senator Gardner?

Senator GARDNER. Thank you, Madam Chair, and thank you to Chief Tidwell and the other witnesses for being here today. It is a timely hearing we are having.

On Saturday Senator Bennet and I in Colorado are hosting a fire summit in Colorado Springs which is, of course, the site to the Black Forest fire a couple of years ago, the Waldo Canyon Fire and a number of other devastating events have occurred throughout the state. Over two dozen wildfire experts, community experts and mitigation experts will be joining us. I will ask you about that in a little bit.

I wanted to follow up on some of your testimony. Where you talked about progress in retrofitting the HC31H aircraft that the service acquired from the U.S. Coast Guard. How many of these aircrafts will be ready to perform wildfire suppression missions this summer?

Mr. TIDWELL. Senator, we'll have one of those aircraft in the latter part of the fire season that we're going to be putting the MAFF's tank in it to be able to start to use that this year. And then by the end of the year we expect to receive the second one. It will be 2019 before we'll have probably all seven of them with the tanks built into the planes.

Senator GARDNER. The timeline for completing it, that gives the timeline for completing the wing box and the tank work that is required to bring them into service is 2019?

Mr. TIDWELL. Yes, we'll have all seven of them in operation by then.

Senator GARDNER. Okay, very good, thank you.

Do you have an update on the Forest Service ground water rule? What is the status of that right now?

Mr. TIDWELL. We have withdrawn our initial proposed rule to allow us more time to continue to work with the states and the stakeholders to really address this issue. Our concern about making sure that we're not impacting ground water.

I'm working with our regional foresters to ensure that as we have to address these issues, especially on some large mines and oil and gas leases, is that the lack of having a systematic, consistent process doesn't become a barrier from being able to move forward and address those projects. We've withdrawn for this time and we're going to continue to work with the states to be able to, sometime in the future, to have a solution to this issue so that we do not become the barrier to implementing some of these projects.

Senator GARDNER. One of the things I think you heard is a common theme for many members of the Committee is just continuing to talk about the litigation and the parent paralysis that sometimes that presents in terms of making sure that we are managing our forests in an appropriate way so we can avoid or prevent the catastrophic wildfire from happening in the first place.

If there was one particular avenue of litigation or perhaps a piece of legislation that you could draft yourself to avoid some of the litigation that is stopping or holding up some of the forest management activities that are so needed around the country, what would it be?

Mr. TIDWELL. I would first start with looking at ways to incentivize collaboration. As I look at the success that we're having, today verses earlier in my career, that is the one thing that's making the difference, the level of support and understanding that we have to be able to do these projects. So any way we can continue to, you know, encourage that. I also think this concept of arbitration is something that I'm interested in exploring in a pilot fashion to see if that might be a better way.

The other thing is also when we talk about our using the Farm bill authorities to be able to reduce the amount of analysis we have to do instead of looking at sometimes five and six alternatives, we look at two. That also allows us to be able to ensure that we're addressing the issues around those alternatives verses having to look at a much broader piece of work. I think that will also help us to be more efficient and more effective. But those are the things that I've been thinking of.

Senator GARDNER. Thank you.

Talking about some of the FEMA and the disaster declarations, are you aware of some of the challenges we have after a fire when it comes to the FEMA declarations themselves? Has the Forest Service weighed in on any proposal to perhaps change our disaster declarations?

Mr. TIDWELL. Well, we work very closely with the states during the fire on those to be able to make sure that they're getting, send those in as quickly as they possibly can and to be able to provide our interpretation.

Senator GARDNER. I guess what I am talking about is long after the fire is out we have the ongoing flooding issues, we have landslide issues, hydrophobic soil conditions, and FEMA can sometimes leave the scene even though that creates secondary emergencies that then have to receive their own designation. Has the Forest Service weighed in on perhaps changing our national disaster declaration process so we can avoid some of the regulatory hurdles that are naturally occurring after a fire?

Mr. TIDWELL. You know, we have not engaged on that, but we definitely recognize the problem. I think it's another area that we need to work together to be able to find a way to be able to recognize that, yes, there's the fire and then there's the recovery afterwards. And often that's more detrimental, more impacting than actually the fire itself, as you've seen, you know, in your state.

I think it's an opportunity where, I think, we can look at taking a different approach so that we can do a better job to work with our communities to be able to have a timely response that goes way beyond what we're currently doing just with our area emergency rehab work.

Senator GARDNER. I was on the Western Slope this past weekend and have just one final question. I was talking to an individual who manages a narrow gauge railroad. He has his own fire fighting fleet because, if there is a fire that is started by the railroad that creates, obviously, liability and substantial damage to his community.

As a result of some conflict between Forest Service regulations he is sometimes limited in where he can send that fire fighting fleet out to actually put a fire out before it becomes a major fire

and there are some challenges with a helicopter that they have contracted to go in. I would love to work with you in terms of trying to find out a way that we could partner with the Forest Service and this fire fighting fleet.

Both the Forest Service and this individual have the same goal in mind and that is to prevent the forest fire from happening in the first place, and perhaps we can make sure that we can get the regulations into place where we are able to put the fire out without finger pointing.

Mr. TIDWELL. We'd be glad to work with you and the individual on that. I mean, that's the sort of thing that through, especially working with the state foresters that we have the authorities to be able to do that. It may just be making sure that we've got everything in place, and then also we always share—have the concern with safety.

Senator GARDNER. Right.

Mr. TIDWELL. To make sure that whoever is responding to the fire has the equipment, has the knowledge and the skills so they can do it safely.

Senator GARDNER. Right, thank you.

The CHAIRMAN. Senator Risch?

Senator RISCH. Thank you, Madam Chairman.

Chief Tidwell, you and I spoke just very briefly before the hearing about some correspondence that your office received from the State Land Board in Idaho. As you lived in Idaho you are well familiar with the State Land Board, and they oversee the state forest holdings and other holdings. They are concerned, as you and I have discussed and as you have discussed with many Members of Congress, and really focused on some optimism, hopefully around the provisions in the Farm bill, that are going to give us the opportunity to do some of these treatment projects that we have wanted to do.

I do not think I need to tell you, but there is a lot of frustration out there that it is not moving as fast as we would like. I think maybe people had expectations raised beyond what is reality when you are dealing with the Federal Government, unfortunately, but I would urge you to continue. I think it is still untested. We are making some progress on it, but I would sure urge you that we continue to put one foot in front of the other and try to mature this process as rapidly as we can.

Mr. TIDWELL. Senator, I agree with that. We will be glad to provide the Land Board out in Idaho and also to you and your staff, just a list of all the projects we have planned in Idaho using the Farm bill authorities.

Senator RISCH. Okay.

[The information referred to follows:]

All projects included in the attached list are occurring in the designated insect and disease areas (aka priority landscapes) and are using or have potential to use Farm Bill authorities. Projects that show “pre-Farm Bill” in the NEPA Process column were already in progress or completed prior to the 2014 Farm Bill and did not use Farm Bill authorities but are occurring in the priority landscapes.

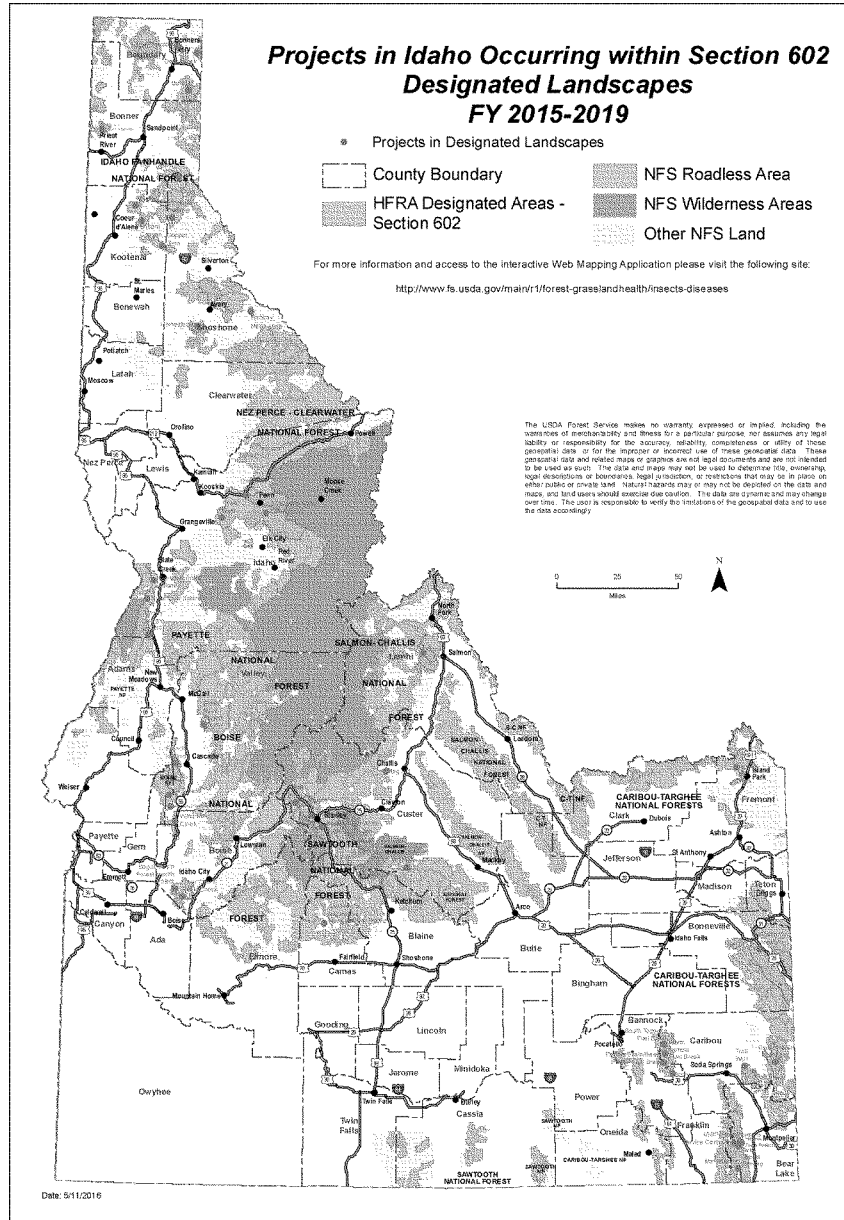
U.S. Forest Service Regions 1 and 4: Projects in Designated Insect and Disease Areas in Idaho thru FY 2019/20

	Region	Forest	District	County	Type of Project	NFA Process Anticipated	Estimated Sale Date	Estimated Acres	Project	Collaborative Forest or Group
Northern	(R1)	Iado Panhandle	Coeur d'Alene River	Kootenai	Farm Bill	HRA EA	November 2016	2900	Benton Canyon	Panhandle Forest Collaborative
	(R1)	Mtbn Panhandle	Priest Lake	Bonewy	Farm Bill	HRA EA	November 2018	2340	Jasper Mountain	Panhandle Forest Collaborative
	(R1)	Idaho Panhandle	Sr. Joe	Bonewy	Agricultural Farm Bill	HRA EA	March 2018	1300	Halfway Main	Panhandle Forest Collaborative
	(R1)	Idaho Panhandle	Bonewy Ferry	Boundary	No-Farm Bill	Non-HRA EA	July 2017	4500	Deer Creek	Kootenai Valley Resource Initiative (KVRP)
	(R1)	Idaho Panhandle	Coeur d'Alene River	Shoshone/Kootenai	Potential Farm Bill	HRA EA/EIS	October 2019	5000	Porters Wheel	Panhandle Forest Collaborative
	(R1)	Idaho Panhandle	Coeur d'Alene River	Kootenai	Potential Farm Bill	EAD/TBD	October 2020	3000	Binco Ranch	Panhandle Forest Collaborative
	(R1)	Idaho Panhandle	Coeur d'Alene River	Shoshone/Kootenai	Potential Farm Bill	TBD	March 2021	2900	Copper John	Panhandle Forest Collaborative
Northern	(R1)	Idaho Panhandle	Bonewy Ferry	Boundary	Potential Farm Bill	TBD	May 2017	3000	Bozler	Kootenai Valley Resource Initiative (KVRP)
	(R1)	Idaho Panhandle	Shoshone & Coeur d'Alene River	Boundary	Potential Farm Bill	TBD	July 2019	5000	Buckskin Saddle	Panhandle Forest Collaborative
Northern	(R1)	Idaho Panhandle	Bonewy Ferry	Boundary	Potential Farm Bill	TBD	July 2020	5000	Camp Dawson	Kootenai Valley Resource Initiative (KVRP)
	(R1)	Idaho Panhandle	Sr. Joe	Shoshone	Potential Farm Bill	TBD	March 2020	1500	Broder's	Panhandle Forest Collaborative
Northern	(R1)	Idaho Panhandle	Sr. Joe	Shoshone	Potential Farm Bill	TBD	May 2020	2000	Homestead	Panhandle Forest Collaborative
	(R1)	Clearwater	Moore Creek	Idaho	Farm Bill	Farm Bill CE	February 2017	227	Lowell Hill	CHRP
Northern	(R1)	Net Perce-Clearwater	Moore Creek	Idaho	Farm Bill	Farm Bill CE	February 2017	2500	Tinker Ridge	CHRP
	(R1)	Net Perce-Clearwater	Moore Creek	Idaho	Farm Bill	Farm Bill CE	February 2018	1000	SOO/Park/Moore Ck Wash	CHRP
Northern	(R1)	Clearwater	Saltun River	Idaho	Farm Bill	HRA EA	February 2018	3000	Race Cow Island	Process
	(R1)	Clearwater	Saltun River	Idaho	Farm Bill	Farm Bill CE	February 2018	<3000	Garter Johnson Island	Process
Northern	(R1)	Net Perce-Clearwater	Saltun River	Idaho	Farm Bill	Farm Bill CE	February 2018	3000	Windy Shingle Island	Process
	(R1)	Clearwater	Saltun River	Idaho	Farm Bill	Farm Bill CE	February 2018	3000	Wilsons Creek	Collaborative Process
Intermountain	(R1)	Boise	Emmett	Valley/Rogue Valley	Farm Bill	HRA EA/EIS	April 2015	1600	High Valley Integrated Restoration	Boise Forest Coalition
	(R1)	Boise	Carlsbad	Valley	Farm Bill	HRA EA/EIS	February 2017	3500	French Haard	Boise Forest Coalition
Intermountain	(R1)	Boise	Mountain Home & Idaho City	Boise	Farm Bill	Farm Bill CE	February 2017	2,500	Logan Basin Forest Health Project	Boise Forest Coalition
	(R1)	Boise	Mountain Home & Boise City	Boise	Farm Bill	HRA EA/EIS	February 2019	11,500	Clear Creek-Robie Creek	Boise Forest Coalition
Intermountain	(R1)	Boise	Emmett	Gorn Valley	Farm Bill	Pre-Farm Bill	February 2020	20000	Sagehen	Boise Forest Coalition
	(R1)	Boise	Montpelier	Boise/Lake	Pre-Farm Bill	Pre-Farm Bill	N/A	910	McGowan/Fair Reduction	Boise Forest Coalition
Intermountain	(R1)	Cariboo-Targhee	Montpelier	Boise/Lake	Pre-Farm Bill	Pre-Farm Bill	N/A	600	Mad/Park Source Contant	Boise Forest Coalition
	(R1)	Cariboo-Targhee	Montpelier	Boise/Lake	Pre-Farm Bill	Pre-Farm Bill	N/A	20	Holloway TS	Boise Forest Coalition
Intermountain	(R1)	Cariboo-Targhee	Montpelier	Boise/Lake	Pre-Farm Bill	Pre-Farm Bill	N/A	100	Bees Retreat Thinning	Boise Forest Coalition
	(R1)	Cariboo-Targhee	Montpelier	Boise/Lake	Pre-Farm Bill	Pre-Farm Bill	N/A	50	Manzanita	Boise Forest Coalition
Intermountain	(R1)	Cariboo-Targhee	Weiss de	Good Springs	Pre-Farm Bill	Pre-Farm Bill	N/A	300	North Public Fuel Break	Boise Forest Coalition
	(R1)	Cariboo-Targhee	Weiss de	Good Springs	Pre-Farm Bill	Pre-Farm Bill	N/A	600	Public Basin/Bench Hollow Fuel	Boise Forest Coalition
Intermountain	(R1)	Cariboo-Targhee	Weiss de	Good Springs	Pre-Farm Bill	Pre-Farm Bill	N/A	20	South Spruce Fire Drain	Boise Forest Coalition
	(R1)	Cariboo-Targhee	Weiss de	Good Springs	Pre-Farm Bill	Pre-Farm Bill	N/A	300	Vale Creek Contact	Boise Forest Coalition
Intermountain	(R1)	Cariboo-Targhee	Palisades	Remondish	Potential Farm Bill	HRA EA/EIS	February 2017	300	Huron Aspen	Boise Forest Coalition
	(R1)	Cariboo-Targhee	Palisades	Remondish	Potential Farm Bill	HRA EA/EIS	February 2017	1000	Huron Aspen	Boise Forest Coalition

U.S. Forest Service Regions 1 and 4: Projects in Designated Insect and Disease Areas in Idaho thru FY 2019/20

Region	Forest	District	County	Type of Project	NFRA Process Anticipated	Decision Anticipated	Estimated Sale Date	Estimated Acres Treated	Project	Collaborative Process or Group
Intermountain (B1)	Canyon-Targhee	Westside	Franklin	Potential Farm Bill	NFRA E/IES	FY 2017	N/A	200	Brill Canyon Hazardous Fuels Reduction	Collaborative Process
Intermountain (B2)	Crook-Targhee	South Slope	Soda Springs	Potential Farm Bill	Farm Bill CE	FY 2017	FY 2018	500	East Hill	Collaborative Process
Intermountain (B4)	Salmon-Challis	Glacier-Tenure Fork	Custer	Farm Bill	Farm Bill CE	FY 2016	September 2017	3000	Bk Hill	Collaborative Process
Intermountain (B4)	Salmon-Challis	Salmon Cobalt	Lemhi	Farm Bill	Farm Bill CE	FY 2017	September 2017	3000	Jesse Creek	Collaborative Process
Intermountain (B4)	Salmon-Challis	Lost River	Ouster	Potential Farm Bill	Farm Bill CE	FY 2018	September 2020	3000	Barlett Creek	Collaborative Process
Intermountain (B4)	Sawtooth	Sawtooth National Recreation Area	Ouster	Farm Bill	Farm Bill CE	Signed	August 2016	3000	Bedley - Rd #110 Fuels Reduction	Collaborative Process
Intermountain (B4)	Sawtooth	Sawtooth National Recreation Area	Ouster	Potential Farm Bill	Farm Bill CE	FY 2016	August 2018	900	Stanley Basin	Stanley Collaborative
Intermountain (B4)	Sawtooth	Sawtooth National Recreation Area	Ouster	Potential Farm Bill	Farm Bill CE	FY 2017	FY 2018	3000	Cape Horn	Stanley Collaborative
Intermountain (B4)	Sawtooth	Extruded	Camas	Potential Farm Bill	Farm Bill CE	FY 2016	August 2017	3000	Salmon River Vegetation Management Project	Collaborative Process
Intermountain (B4)	Payette	McCall	Valley	Potential Farm Bill	NFRA E/IES	FY 2019	FY 21-24	4000	Sloan Point Project	Collaborative Process

This list is current as of May 9, 2016. A similar list, minus the Estimated Sale Date column and last row (Sloan Point Project), is posted on the internet at <http://www.fs.usda.gov/main/4/forest/gradesandhealth/Insects-diseases>. This list and associated maps will be updated quarterly, with the next update expected to occur early July 2016. The Estimated Sale Date column will be included on future versions posted online.



Mr. TIDWELL. And then later this summer we'll finish the Paperwork Reduction Act requirements so we can move forward with the Good Neighbor Authority.

We have taken some additional time to work with the state foresters to produce templates about how to use that. And because of taking out additional time and actually doing some scenarios with them, we call them Sand Table exercises, where you'd actually go through a process to see how would this actually play out to be able to work together to implement a project. Because of that we've made significant changes to template the feedback I'm getting from the state foresters that they feel that's going to be a much better tool. So taking a little more time on it is going to, I think, really help us in the long run.

Senator RISCH. I have spoken with Mr. Schultz, who I think you know, who heads our State Land Board. He is very anxious to see this move forward, and he is in agreement that this has some real potential if it is moved expeditiously and appropriately. I appreciate your efforts in that regard.

Mr. Eisele, I was surprised to hear you say that you were short on the ground of overhead photography in a fire. When I was Governor we had a summer that there was a lot of fire on and every morning before it got light I had in hand a map of what the fire had done from satellite imagery and some other overhead imagery of what the fire had done the day before. I am surprised to hear you say that that is not available to you in San Diego. I am assuming you have satellite imagery in San Diego like we do in Idaho? What can you tell me about that?

Mr. EISELE. So the process you're referring to is the NIROPS program where the Forest Service airplane flies an infrared plane over all the fires burning in, basically, the Western United States. Then the fire teams have that information before six o'clock in the morning, and I do know where the fire is then. The issue is that fires change during the day. We now know where the fire was last night and we know where the fire was the night before. We don't have real time information.

Now the Forest Service research does have an airplane with a fire mapper program that can fly at above the altitude of the air tankers and all of the helicopters and now can continuously map that fire and send real time data down, but it's a research program.

Senator RISCH. So you are looking for hour-by-hour as opposed to what happened the day before?

Mr. EISELE. Certainly or at least more than once every 24 hours.

Senator RISCH. Sure, yes, that clearly makes sense. In today's world with the technology we have it would seem to me that that would not be that difficult to do. Predictability obviously is important, and with weather changing and what have you, sometimes it is relatively predictable and sometimes not.

Thank you very much, I appreciate it.

Thank you, Madam Chairman.

The CHAIRMAN. Thank you, Senator Risch.

Senator Hoeven?

Senator HOEVEN. Thank you, Madam Chairman.

Chief, it is good to see you again. Thanks for your recent visit to North Dakota. I would just like to follow up on that.

My first question goes to the environmental assessment and the allotment plan for the grazers. In both cases they wanted changes made proactively. Can you give me a status report on how you are coming with that?

Mr. TIDWELL. Senator, the follow up with that meeting our folks, our staff, are going to continue, we're going to continue to work with the Grazing Association members to be able to address their concerns. I think I want to thank you for hosting that meeting, because I also think it helped to clarify a few issues to help us to be able to move forward and address their concerns.

Senator HOEVEN. So you feel you will be, working with your state director, be able to make adjustments that should work for the grazing associations and the ranchers?

Mr. TIDWELL. Yes, I was optimistic after listening, you know, from the work there done at the university that I think we provide a slightly different approach, one that I think would work for both the ranchers and also address our needs.

So that was the thing I left with that meeting is that a little different approach that was being proposed there that could help, I think, really once and for all, kind of, settled this one issue that we've had there.

Senator HOEVEN. I appreciate that.

The other thing I would like to emphasize is working with NDSU range scientists, particularly Dr. Souvik. I think that not only are they very knowledgeable and they focus on the science, but they also have a lot of credibility with the ranchers and their area. So I would emphasize that you work closely with NDSU and their range scientists, particularly on the three and a half inch visual obstruction reading. I think they can really help get to a solution that the ranchers feel is common sense and workable.

Mr. TIDWELL. Yes, and that's the issue that the university and the doctor, he has come up with a different approach to really determine which areas actually have the capability to produce that stubble height. I think from the discussions we had there at your meeting and a little bit of follow up discussion, I left there being more optimistic than I've been for a while that hey, this is a better approach that the university is coming up with for us to be able to answer that question about which areas are capable or not. And it seems like that's really been the issue. The ranchers can manage their livestock to be able to produce the stubble height we'd need. We just need to be able to understand which areas are actually capable and which ones are not.

Senator HOEVEN. Right.

Mr. TIDWELL. And I think once we can come to an agreement on that I'm optimistic that we can put this issue behind us and move forward.

Senator HOEVEN. In order to continue the Dakota Prairie Grasslands demonstration project, does that require legislation or is that something you can do without legislation?

Mr. TIDWELL. We can continue to work under that demonstration project. At this point we don't need any additional legislation.

Senator HOEVEN. Okay. It is important that we continue it.

Let me switch to the fire piece. I know you are getting a lot of question on fires, but it looks like we are drier this year. We cer-

tainly are drier this year starting out than we have been the last several, particularly in the West.

So address for a minute your approach to the grasslands in terms of steps you are taking to be prepared for fires this season. Obviously we are very focused on the forests, but the grasslands have fire issues as well.

Mr. TIDWELL. Yes, well the grasslands are part of the national forest so it's for when I talk about the national forest I'm always including the grasslands.

What we're doing there in the state is what we're doing across the country is to be working with our cooperators, with the volunteer fire departments, so that we're ready to go when the fire season which in your case has already started. If I recall the day I was up there just a couple days before we'd already had several fires in your state that people were explaining to me they just never see this level fire behavior occurring so early in the year.

Those are the things to make sure that we have the resources we need, that people are ready and that if there's anything that we need to address that we can take care of ahead of time.

In your state, like many states, it's those volunteer fire departments that are a big part of our initial attack resources. They're responsible for being able to get there quickly and be able to suppress so many of the fires. And so it's like in your state and the rest of the country, it takes all of us working together, the Federal Government, the State, counties and local fire to be able to deal with this.

Senator HOEVEN. Then address the controlled burn issue for a moment too. Obviously I am particularly sensitive to this issue because it is dry, and we really want you working with the people on the ground, not just the land owners, but obviously volunteer fire departments and everyone else. So let's touch on controlled burn for just a minute. Are you going to stay away from it this year because it is drier? What is your plan?

Mr. TIDWELL. Well, definitely. When we have those conditions that we have up there we often are not going to get in prescription to begin with. But we're only going to be doing prescribed burns where we have, you know, kind of the agreement and the support from the grazing associations where in part of your state it's a little bit wetter. That association is very supportive of more fire. Other parts that are drier we don't have that, at least that agreement at this point. So we're not going to be using a lot of prescribed fire in those areas until we have the right conditions and the level of agreement so that everyone's together on what's the value of this and make sure that we're factoring in the risk to avoid the situation we had a couple years ago.

Senator HOEVEN. Thanks again, Chief. I appreciate it.

The CHAIRMAN. Thank you, Senator Hoeven.

We were discussing about how we get the accurate imaging of the fire. During the Funny River fire that we had last year on the peninsula the state was able to use drones to determine where that hot spot was and found it very effective, because it was one of those situations where the smoke was so thick you did not know what was happening and there was no real way to pinpoint it at that

time. So the technologies that are out there, I think, that can clearly help to make a difference as we try to battle these fires.

Mr. Eisele, you mentioned the significance of having an app where people know who is where and from a safety perspective, making sure that those who are fighting our fires have some tools that, perhaps, we have not had in the past.

We have not really had much discussion this morning about the wildland urban interface and the fact that 50 to 95 percent of Forest Service's fire suppression costs are incurred protecting private property, and we all know about the Fire Wise program. We certainly see the benefits of when a homeowner takes very proactive steps to ensure a level of safety through clearing around their areas.

I remember flying over the Kenai Peninsula some years ago after horrible fires, and you would see just nothing but charred blackness and then there would be this little island of green where they had created defensible space. Just because of the education that goes on with the Fire Wise program I think we recognize that we can reduce the cost of suppression if the homeowners as well take an active role in management.

Chief, can you speak to what we are doing to encourage that end of it? Again, it is preventive, but are we using sufficient resources to allow for an understanding, a training and an education for folks so that they too are making a difference?

Mr. TIDWELL. Madam Chair, we are making, I think, even more and more progress each year. Especially with our cohesive strategy that we put together working very closely with the states, the counties, the boroughs and you know, with cities to come up with an understanding of really what's it's going to take and then the tools to be able to create that level of awareness, especially with the private land owners. And then to be able to set up demonstration projects around the country to be able to show the difference that we're making. We're also prioritizing some of our fuels money so that it's going to those areas where the state, the private land owner is doing the work on their land and so that we can make a more effective treatment area. So those are the things that we're continuing to do, and I think it encourages more people to maybe do the right thing with their private land than to have those demonstration projects where they can see the difference that it makes and what it really takes, because some folks think they have to like completely clear all of their land of all trees and brush and we don't need to do anything to that level. Those demonstration projects are really helping the private land owners to be able to see, okay, this is really what I need to do.

We're working very closely with our state foresters through our state fire assistance programs to help provide some funding to be able to do this work not only on the national forests, but also on the private land together. Through this cohesive strategy I do believe that it's going to really help us to move forward in a bigger way than we have in the past. I've never seen this level of support and understanding from our partners, from the states and the counties, the boroughs and the cities that I have based on this cohesive strategy.

The CHAIRMAN. If you are looking for demonstration projects I would just suggest you put people in an airplane and fly over some of these areas where you see the blue tarps that arc.

Mr. TIDWELL. Yes.

The CHAIRMAN. Where you still have surviving structures, again, amidst some pretty tough devastation here.

I was up in Iqaluit, Nunavut territory for the Arctic Ministerial meeting with Secretary Kerry, and one of the frameworks that was discussed there at the Arctic Council was a focus on an effort to reduce black carbon emissions in the Arctic. The Council's action is probably more focused on manmade black carbon, but the reality is that the largest contributor to black carbon is really the wildfire. I would just ask if the Forest Service is going to have any role at all in this black carbon initiative with the Council? If you do not know you can get back to me or submit your answer for the record, but I do want to put that on your radar screen because it is something that, I think, we have not really talked about. We are talking about the manmade, but, I think, again, the issue of wildfire is where we see the vast majority of that black carbon.

Mr. TIDWELL. Madam Chair, I'll follow up, but I do know that we have a couple of our research scientists that are working with that group. The point that you bring up about the carbon that's released from these fires, we can make a difference if we can reduce the level of severity and the catastrophic size of some of these fires as far as the total release verses doing it through more of a prescribed fire and a much lower severity.

So those are the things that, as we really look at this problem, we need to be factoring in all of the benefits that come in from having an approach that can restore these forests and at the same time take suppression where we need to take suppression to protect our communities.

The CHAIRMAN. One last question, very quickly.

In the Fire Potential Outlook Alaska's highest risk of significant wildfire potential is in the May time period, and it is my understanding that we are seeing fire season earlier and earlier. I mentioned to you, just my own personal view, from flying into the interior this weekend. Do we track that so that we can actually identify that the fire season has started in places like Alaska even earlier than traditionally seen?

Mr. TIDWELL. Yes, we track the changing conditions to make sure that if we need to bring on resources earlier than what we normally would do that we bring those, that we have those resources available.

The CHAIRMAN. That was specifically what I was going to ask because you basically budget for this. You have got your assets that are on standby, but if in fact we are seeing our fires start earlier do we have them co-located in areas that we can be responsive or do we wait until the calendar says fire season begins in Alaska?

Mr. TIDWELL. We do not wait.

The CHAIRMAN. Okay.

Mr. TIDWELL. We—

The CHAIRMAN. That is what I need to know.

Mr. TIDWELL. We reposition our resources where they're needed.

The CHAIRMAN. Okay.

Senator Cantwell?

Senator CANTWELL. Thank you, Madam Chair.

Chief Tidwell, I wanted to go back to you on the question that I asked before. I did not think we got a chance to get to that, and that was the amount of funding that is available versus the amount of need that we have on the wildland urban interface. Where do you think we need to go in terms of getting resources and what do you think the advent of a biomass program might be able to do to help?

Mr. TIDWELL. Well first, with the increase in funding that we received this year for hazardous fuels and where the majority of our work is in the wildland urban interface, that is going to allow us to be able to expand that program and be able to treat more acres. For instance, we're having 2.5 million acres as our target for this year, and out of that 2.1 of that is going to actually occur in these highest priority areas. The second part of it is with finding more use for the biomass and whether it's through an integrated wood product that can expand markets or to be able to use it for energy conversion and substitute that for other energy sources. I think those are the things we have to continue to work on.

I think where we've been able to use the BCAP authorities that subsidize the transportation of biomass, it's allowed for new facilities to come online to be able to provide some additional support for those new businesses. Those are the things we just need to continue to be able to work on, and then the program that we have to help folks be able to receive grants to do the economic analysis, to put a business case together, so that they're in a much better place before they make the decision to make that investment.

The last point that's been brought up a couple times is the certainty. It's essential that we provide some level of certainty, especially for these new operations, so that that's the one thing they don't have to worry about that there is going to be x amount of biomass that's guaranteed to be available for at least a ten year period.

Senator CANTWELL. Why do I think of the set aside issue when you say that? The notion that the Forest Service needs to adhere to the set aside for small businesses?

Mr. TIDWELL. Well it's one of the things, with our stewardship contracting, it's one of the issues that once, thank you again for making that permanent for us, but we're working with the Small Business Administration to be able to go through rulemaking to address that issue.

Senator CANTWELL. Okay. We definitely want to see us make progress. And if you're saying that part of this is getting, you know, a flow of the biomass to create these businesses.

Of the, you said \$300 million, what do you think that represents as far as addressing need? Do you think there is a number that is double or triple that that you could easily do if you had the resources?

Mr. TIDWELL. Well I would respond with what we requested in our budget for FY'16 to maintain the increase in hazardous fuels that we received last year to be able to expand the collaborative forest landscape restoration work, to be able to get more funding for our basic forest restoration work and then also some additional

funding to work with the states to be able to expand the work that they're doing.

Those are the things that we asked for in our budget, along with recognizing that our ten year average for fire suppression went up \$115 million again just this last year. So when you total those numbers together, our budget request plus what we're asking, needing for fire suppression and ten year average, it's, I think it actually comes out to a little over \$300 million.

Senator CANTWELL. When you say what you've said today in your testimony and questions, it sounds to me more, I am not saying status quo, but it is sounding more like we are on the right trajectory. Then when I see this research report from your organization it says something different. So where are you on that research report because it is within the Forest Service?

Mr. TIDWELL. Yeah, I just was reading that at the start of the hearing. You know, the research I think, identifies really what we're focused on and the shifts that we've made over the last few years to recognize the need for us to manage fire, not only the natural fire in the back country, but we'll have our fires where we're taking very active suppression on part of that fire and then at the same time allowing another portion of that fire to be able to burn, to be able to reduce fuels.

A good example of this was the Rim Fire a couple years ago in California. Aggressive suppression to keep the fire out of the communities, but at the same time we allowed that fire to burn up until Yosemite National Park where the park had been doing some prescribed burning. So those are the things that we need to continue to do. When I look at that research paper, for me, it describes really where we're at, but we do need to expand. We're going to need to be able to use more natural fire to manage more natural fire, we need to increase our prescribed fire, and we also need to increase our mechanical treatments, especially in those places that we need to do that work before we can put fire into the landscape.

The other challenge we have, and it's pointed out in this paper, is for our communities to really understand what needs to occur. When we're managing fire in the back country there's still a lot of concern. And at times I think some of our communities, that they're scared or worried about where that fire is going to go verses if they know that they see the planes flying and the resources and stuff. So we need to do a better job to work with our communities so that they understand the actions we're going to take and that they recognize the work that we've done to reduce the threat to their communities but to build more support for it.

The other thing, and it hasn't been mentioned yet at the hearing, we're going to have to work together with the states to be able to address smoke management. There are times when we're going to have to, I think, put up with a little more smoke from a managed fire, a low severity fire, to reduce those catastrophic situations.

It's something I think we're going to have to work together to be able to provide that flexibility so that there is less impact, not only to our communities but I think about the loss of tourism, the loss of economic activity when we have these large fires. You saw it in your own state with the Carlton that those communities, there was

nobody going up there to go fishing or float the rivers, etcetera, when that fire was going on.

That's another reason why we need to increase our pace and scale with this work, and I think an incremental approach like what we're taking with our FY'16 budget is the right way so we can continue to ramp this up.

I know I'm way over time, but I just have to mention, like the Salt River. The partnerships that are coming together from communities or water companies that recognize that it's a good investment to be able to change the conditions so that they don't have to deal with the aftermath of a more catastrophic fire. We're seeing that spring up across the country where people are willing. Communities, water companies, and water boards are willing to make that investment to be able to change the conditions on our landscape.

Senator CANTWELL. Thank you.

Dr. Pyne, I see you listening intently to every word that Chief Tidwell was saying. Do you have any comments about that?

Dr. PYNE. No, I'm currently admiring his mastery of the venue and his material.

I think the only comment I would add to some of the observations you made is on the wildland urban interface issue. We've tended to define that as a wildland problem that affects communities, but you can pick up the other end of that stick. Isn't this an urban fire problem with wildland landscaping? If you think of it that way then we know how to keep houses from burning. We've solved that problem before. So in some ways it's a definitional issue. If we start thinking about these as little fragments of cities then we start applying the same solutions we've had, and we can solve it technically.

Senator CANTWELL. Even in these extreme situations like Carlton because it was such a blow up, because of weather and wind and everything?

Dr. PYNE. Yes, I think you can. We know how to harden those communities. We know how to solve some of that. Under truly extreme conditions you're going to have some damage. You're not going to stop everything, but think of it as a kind of hurricane event. We know how to prepare and take action. So in some ways, I think, we're mis-defining it.

I'm struck how often with aerial photos of these communities that have been burned the houses are reduced to the concrete slab, but you still see so many trees around it, surviving. And you're struck by this is a house, an urban fire problem with funding landscaping not just a wildland fire problem. So we need to do both. But I would put more resources, thinking about the other half of that equation.

Senator CANTWELL. So you are definitely describing Pateros because those houses, in a matter of minutes, burned down to the foundation.

Dr. PYNE. Yes.

Senator CANTWELL. But why were you saying that there are trees?

Dr. PYNE. Well, I'm not familiar enough with the Carlton complex. I know there was a lot of disperse stuff. But I'm thinking of,

we had comments from Colorado earlier, the Black Forest fire, Waldo Canyon, some of these others. Looking at the overviews of these and repeatedly that's what you see in forest situations, communities. The fire is going house to house. It's going along the ground of these, and you're wondering why are some of these communities burning? That's a house problem. That's an urban fire problem or an ex-urban fire problem, not just a wildland fire problem.

Senator CANTWELL. Thank you.

Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator Cantwell.

Chief, I am not going to go back to Fairbanks and tell them that they have got to suffer through more smoke. As you know, we have just some extraordinary summers where there is no soccer that is being played, there is a health alert every morning, and some mornings it is so dense you literally need to have your headlights on during the summertime. It is an issue that we deal with. Fairbanks has some of the poorest air quality during the winter because of inversion issues, but during the summer it is because of the wildland fires that are all around. It is something that we struggle with most certainly.

I listened to some of what you said in terms of the average that we spent last year. I think you said about \$150 million more than it has been on average over the last ten years. I have seen something that says almost \$200 million more spent on average. But what we have seen is that there have been less than half the number of fires, less than half the number of acres burned and less than half the number of houses burned.

So again it speaks to the issue that we have here where we are experiencing skyrocketing suppression costs. I think we get to a point where we cannot continue to throw everything that we have at every fire whether it is effective or not. You just cannot take a blank check approach to fighting the fires. It is not sustainable, economically or perhaps ecologically, so it is something that we must look at.

I think we need to strategically address the fuel accumulation problem in our forests and integrate our fuels management objectives into the wildfire management operations. I do not think that we can have fire management divorced from land management, and I think we heard that from several of our witnesses here today.

Clearly, we have got a great deal that we have to do. It sounds weak to say it, but I hope, for our sake, from a budget perspective that it is not going to be a bad fire season. I hope that for the sake of those who have properties or perhaps concerns about their own safety that it is not a bad fire season. I certainly hope for the men and women who, in the face of pretty serious danger, are willing to go out there and battle these forest fires. I hope for them it is not a bad fire season.

But that is not a good policy to hope that we get lucky that we do not have a bad fire season. I think we are seeing things set up for a tough year this year with the drought in the West, low snow pack everywhere it seems except here in the East. So we have some real issues to deal with.

I think, again, you have got a real commitment to figure out how we can deal with this fire borrowing because we cannot get to the fuels treatments. We cannot get to the important aspects of what we can do on the preventive side if we do not have dollars in the budget, if they have been spent on these sky high suppression costs. So we have some work to do, and I think you have the commitment from many around this dais to work with you to find some solutions.

To those of you who traveled far to be here with us this morning, you may not have gotten the bulk of the questions, but know that your testimony and your input is greatly appreciated as we look to resolve these issues that have considerable impact, particularly to those of us in the West.

With that, we stand adjourned and thank you.

[Whereupon, at 12:29 p.m. the hearing was adjourned.]

APPENDIX MATERIAL SUBMITTED

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

Questions from Chairman Lisa Murkowski

Question 1: The Los Angeles Times won the 2009 Pulitzer Prize for Explanatory Reporting for its five-part "Big Burn" series on wildfires. That series revealed that the Federal Government has spent taxpayer dollars and risked employee lives by conducting fire operations that it knows will have little or no impact on the Forest Service's ability to contain a fire or protect property. Does the Forest Service dispute any of the reporting in the series? What kinds of controls and protocols are in place to prevent the kinds of activities that were daylighted in the series from occurring? What cost controls should Congress consider putting in place to get a handle on fire suppression costs?

Response: Since the 2009 LA Times article, the U.S. Forest Service increased our risk management capability through a number of different efforts. The Forest Service defines success as safely achieving reasonable objectives with the least firefighter exposure necessary, while enhancing stakeholder support for our management efforts. Wildfire suppression objectives, strategies, and tactics are determined by professional agency administrators and incident commanders based on a host of factors. These professionals are in effect applying:

- the **Right Plan** (i.e., as informed by the **Standards for Managing Incident Risk**);
- in the **Right Place** (i.e., where we have a reasonable probability of success);
- at the **Right Time** (i.e., under favorable conditions for efficient and effective suppression);
- with the **Right Assets** (i.e., only those suppression assets needed to safely implement tactics in support of reasonable objectives); and
- for the **Right Duration** (i.e., release assets as soon as they are no longer needed or other actions to reduce exposure duration).

Careful attention to these five "**Rights**" will limit unnecessary exposure and expenditure.

There are numerous financial management policies, procedures, and controls in place to ensure that expenditures are appropriate.

First, the agency administrator (i.e. the Forest Supervisor) often in consultation with the regional office, determines the overall objectives for the fire and delegates authority to an incident commander/incident management team to achieve them. The agency administrator and incident commander/incident management team remain in constant communication about appropriate strategies and tactics, which are the primary drivers of cost, to achieve the objectives. In addition, all spending during wildfires is in accordance with established incident business practices.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

Most fire suppression assets (e.g., airtankers, helicopters, crews), equipment (e.g., water tenders, bulldozers), and services (e.g., caterers, showers) that are used during wildfires are obtained through pre-existing contracts that have been awarded through a competitive process with price as one factor.

Second, many of the supplies used on fires (i.e. tools such as Pulaskis, shovels, tents, chainsaw kits, coolers, etc.) are ordered from regional caches which are pre-stocked with items that have been obtained through contracts awarded to private vendors through a competitive process with price as one factor.

Over the last decades, wildfires have increased in frequency, severity, and size and the fire season has increased 60 to 80 days due to hazardous fuel buildups, climate change, drought, insect and disease infestation, non-native species invasions, and other factors. These trends are expected to continue. The Administration has proposed a cap adjustment as a new approach to budgeting for fire suppression. Under the proposal, funds within the budget cap adjustment will only be accessible for wildland fire suppression operations if a declaration has been issued by the Secretary of Agriculture that one of more of the following conditions are met:

- a fire has required an emergency Federal response on a fire of significant complexity, severity, or threat posed to human life, property, or resource;
- the fire covers 1,000 acres or more;
- a fire is within 10 miles of a major urban area (defined as 50,000 inhabitants or more); or
- the cumulative costs of wildland fire suppression operations will exceed all of the amounts previously appropriated within 30 days.

The Forest Service currently treats between 2 and 3 million acres of land per year to reduce the risk of extreme wildfire through mechanical thinning, prescribed fires, and other means. The agency believes that the best way to reduce wildfire suppression costs is to increase the pace and scale of hazardous fuels reduction and other forest restoration efforts. Since 2006, the Forest Service has completed more than 1,700 assessments of fuel treatment effectiveness and found that 87 percent changed fire behavior and 81 percent helped control wildfires.

Question 2: At the recent Arctic Council Ministerial meeting in Iqaluit, Canada, the Ministers, including Secretary of State Kerry, agreed to implement a framework to reduce black carbon emissions. One of the largest contributors of black carbon to the atmosphere is wildfires. While the Arctic Council's action is more focused on man-made black carbon, it could be argued that our forest and timber policies over the last several decades have put us in a position to release massive amounts of black carbon in the form of wildfires. Could you tell me what role the Forest Service has had and will have going forward in the Arctic Council framework to reduce black carbon?

Response: The Forest Service is actively engaged in Arctic black carbon research through our Research and Development mission area and our International Programs division, but the agency is not directly involved with the Arctic Council; however, our research has been referenced by the Arctic Council.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

Questions from Senator Ron Wyden

Question 1: You've been here in front of the Committee before to discuss wildfires, and I know you are well aware of the impacts that wildfires have on the nation's forests and communities, particularly in the West, and the fire borrowing that continues to rob the Forest Service coffers, depleting the funds meant to conduct the very work in the forests that would decrease the number and severity of fires.

As you know, my bill would fix the wildfire budgeting structure to ensure that instead of bankrupting the wildfire account every year, the largest 1% of fires would be treated and funding like other natural disasters.

If we protect the forest management budget every year from being pilfered, those funds will be there to do critical prevention work in the forests. Isn't that correct?

Response: That is correct. There is a limited amount of funding for each government agency/program, so the more spent on suppression, the less there is available for hazardous fuel reduction, other restoration treatments, and cooperative fire protection. Without a legislative fix, the current budget structure effects forest management activities through reduced funding in the Forest Service's budget request and appropriation and/or when funds are reduced through the fire transfer process; which has occurred eight times since Fiscal Year 2002.

Question 2: And, as appropriators determine funding for Forest Service programs for the 2016 Fiscal Year, given the current structure of wildfire funding and going into what is projected to be a particularly difficult fire season, in your opinion: is it better to increase funding for wildfire suppression activities now, or increase funding for the wildfire severity prevention work, in other words: forest restoration, knowing that it may be "borrowed" for wildfire suppression down the line?

Response: The Forest Service believes the only way to effect an outcome of reduced wildland fire risk is through a balanced pursuit of both restoration-related activities and hazardous fuels reduction. The fire cap adjustment enables that balance to be better achieved.

Question from Senator Debbie Stabenow

Question: Chief Tidwell, thank you for all of your work to implement the significant forest service policy reforms that we enacted in the 2014 Farm Bill just over a year ago.

As many on this panel know, the Senate Agriculture Committee plays an important complementary role – along with the Energy and Natural Resources Committee – in evaluating and enacting policy related to our national forests.

In the 2014 Farm Bill we worked in a bipartisan manner to enact several important reforms to our forestry policy, including a nationwide expansion of so-called "Good Neighbor Authority"

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

and the creation of an entirely new program to treat forest stands impacted by insect and disease outbreaks.

Chief Tidwell, can you please give the committee an update as to the Forest Service's progress in implementing these new provisions?

Response: The Forest Service greatly appreciates the assistance provided through the new authorities enacted as part of the 2014 Farm Bill including permanent reauthorization of the Stewardship Contracting Authority, the Good Neighbor Authority (GNA), and the insect and disease provisions.

The agency completed the requirements under the Paperwork Reduction Act to approve the new GNA agreement templates that will be used to carry out projects with the States. The Forest Service worked closely with the states, including the Michigan Department of Natural Resources, to collaboratively develop the new templates. The templates were approved by the Office of Management and Budget on June 24, 2015. Since then, the agency has entered into agreements with Pennsylvania, Utah, and Wisconsin to carry out forest, rangeland and watershed health activities on the national forests in those States.

To date, the Forest Service received letters from 36 States requesting designations under the insect and disease provisions found in Section 8205 of the Farm Bill. In response to the States' requests, the Chief designated approximately 46.7 million acres of National Forest System lands. Currently, 20 projects have been proposed under the Farm Bill Insect and Disease provisions. Sixteen of the projects will be implemented using the new Categorical Exclusion (CE), while the remainder will utilize an Environmental Assessment. These initial projects will help the agency and its partners better understand and implement the new CE authority while additional projects are identified, planned and implemented. Planning and implementation of projects within designated areas will expand in Fiscal Year 2015 and beyond.

Questions from Senator Jeff Flake

Question 1: In your testimony, you state, "The Administration believes these types of wildfires should be considered natural disasters and treated as such for funding purposes." Does authority currently exist for the President to declare wildfires major disasters under the Stafford Act?

Response: There is no current authority for the President to declare wildfires on Federal lands as major disasters under the Stafford Act. Wildland fires on State and local government lands can be declared major disasters or emergencies under the Stafford Act.

Question 2: For purposes of other disasters, such as tornadoes and hurricanes, is a Stafford Act disaster declaration or emergency designation required before those incidents are eligible to access disaster relief funds?

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

Response: Correct, disasters such as tornadoes and hurricanes are covered under the Stafford Act and must be declared as major disaster or emergency by the President before incidents are eligible for disaster relief funds.

Question 3: In the press release announcing the finalization of the Four Forest Restoration Initiative or 4FRI record of decision, the Forest Service states, “To date, approximately, 300,000 acres have received some sort of restoration treatment as part of the initiative.” Please explain how the Forest Service derived this number, particularly in light of reports that mechanical treatment under 4FRI is less than 4,000 acres. Does this number include treatments under other stewardship contracts, such as the White Mountain Stewardship contract?

Response: The 4FRI landscape includes land from four forests, but not the entirety of the four forests. It’s not a one to one relationship. The approximately 300,000 acre restoration footprint includes all thinning and prescribed burning treatments that have been awarded within the 4FRI Collaborative Forest Landscape Restoration Program landscape to date. Of this total, about 241,100 acres of treatment have already been implemented on the ground. The Forest Service has awarded the remainder (about 49,500 acres) for treatment. Approximately 100,000 acres of the restoration footprint are from thinning treatments and 200,000 acres are from prescribed burning. The 100,000 acres of mechanical thinning awarded includes the recent Phase 1 Contract (31,452 acres awarded) as well as the White Mountain Stewardship Contract (19,751 acres awarded, FY10-FY14) and other timber sales and thinning contracts within the 4FRI landscape (51,179 acres awarded). The 4,000 acre figure referenced in the question above is the number of acres that have already been implemented on the ground through the recent Phase 1 Contract to date.

Question 4: Please provide the number of acres that have been analyzed as part of the Collaborative Forest Landscape Restoration Program (CFLR) and the number of acres actually treated under that program. Do any of the treatment numbers include adjustments similar to the 300,000 acre number that was reported as part of 4FRI?

Response: The numbers below represent the project accomplishments reported in the official Forest Service databases of record used by CFLR and other programs to track progress each year. Depending on the nature of the activities involved, each of these performance metric acres may be counted in the year contracts are awarded and obligated or after the treatment is complete.

For forest vegetation established and forest vegetation improved, acres are reported once the contracts for work have been awarded and obligated. Acres of invasive plant and noxious weeds treated are reported once contracts for the work have been successfully obligated. Likewise, terrestrial habitat acres improved or enhanced are reported once the contracts are awarded and obligated. Hazardous fuels treatments (both within and outside of the wildland urban interface) are reported once the treatments have been accomplished on the ground.

U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell

Project	Forest Vegetation Established	Forest Vegetation Improved	Invasive Plant and Noxious Weed Treatments	Terrestrial Habitat	Hazardous Fuels Treatments within the Wildland Urban Interface	Hazardous Fuels Treatments Outside the Wildland Urban Interface
4FRI	19,896	69,269	14,472	304,276	203,183	96,425
Burney Hat	1,607	4,625	0	2,494	2,911	4,592
Colorado Front Range	4,910	19,814	2,681	13,599	33,176	969
Amador Calaveras Cornerstone	0	3,079	381	1,761	3,441	2,832
Deschutes	2,759	6,196	5,620	8,566	53,945	4,167
Dinkey	654	4,017	9	11,470	11,438	7,748
Grandfather	44	1,174	142	7,480	13,952	380
Kootenai Valley Resource Initiative	876	1,283	1,365	2,572	3,844	262
Lakeview Stewardship	6,107	21,600	2,256	26,459	19,392	42,682
Longleaf Pine (Mississippi)	417	741	589	307,081	223,535	261
Accelerating Longleaf Pine (Florida)	11,717	11,695	80	59,021	99,116	72,769
Missouri Pine Oak	1,039	12,649	508	32,784	21,893	25,186
Northeast Washington Vision 2020	79	5,117	534	6,860	16,635	2,238
Ozark Highlands	558	4,334	6,920	139,257	33,149	23,116
Selway	166	1,767	14,821	15,776	4,840	56,426
Shortleaf Bluestem	1,890	4,755	44	236,381	104,870	57,528
Southern Blues	0	16,100	72	15,687	22,302	46,278
Southwest Crown	10,815	2,813	10,245	28,123	13,113	7,336
Southwest Jemez Mountains	0	3,226	171	14,925	19,576	3,232
Tapash	0	2,799	3,966	17,800	12,656	4,148
Uncompahgre	1,402	4,257	2,418	24,322	5,164	11,435
Weiser Little Salmon	3,022	6,054	6,312	56,552	13,714	39,248
Zuni Mountain	0	7,042	0	2,664	9,251	0

*In some instances the same treated acre resulted in more than one accomplishment, therefore, the number of acres reflected above are not additive.

Question 5: Following the 2013 Rim Fire in California, the Forest Service was able to quickly process the NEPA analysis on salvage operations using an alternative approach approved by the Council on Environmental Quality. Will a similar expedited process be available for salvage operations during this year's fire season?

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

Response: Local Forest Service staff, in close coordination with the Council on Environmental Quality (CEQ), used a strategic approach to NEPA compliance for Rim Fire recovery activities to address public health, safety, and restoration needs. For these specific activities, an Environmental Assessment was prepared first under normal NEPA procedures to address roadside hazard tree removal. Subsequently, an Environmental Impact Statement was prepared and included CEQ Alternative Arrangements reducing regulatory timeframes to ensure timely restoration work would be accomplished to address safety concerns. Currently, an additional EIS is underway using normal NEPA procedures to analyze non-emergency post timber sale activities.

This approach is among the options available to Forest Service units to address post-fire public safety concerns and restoration needs in a timely manner. Alternative arrangements can be issued by CEQ, in consultation with the Forest Service, when an action is deemed to be necessary to protect human health or safety, or protect natural resources, or both, and is likely to result in significant environmental impacts. Alternative arrangements are customized for each situation through consultation and coordination between the Forest Service and CEQ. The Forest Service is currently working closely with CEQ to address safety and restoration needs following the 2014 fires on the Klamath (Westside Fire Recovery) and Eldorado (King Fire Restoration) National Forests.

Question 6: I understand that the Forest Service regional office has forwarded a traditional cultural place recommendation on Oak Flat to the Department of the Interior and the Keeper of the National Register. Can you provide an updated on the status of the potential listing, as well as the level of engagement between the Forest Service and the Arizona State Historic Preservation Office regarding this potential listing (e.g., the number of meetings, types of correspondence, and level of inclusion of the Arizona comments in the Forest Service recommendation)? Please also provide a copy of the comments submitted by the Arizona State Historic Preservation Office to the Forest Service regarding the possible listing. Please also explain what impact a traditional cultural place listing would have on any NEPA analyses involving Oak Flat.

Response: The National Register nomination package is under review at the Keeper of the National Register. This package was shared with the Arizona State Historic Preservation Office (SHPO) and all comments from the SHPO were addressed when preparing the final nomination. Per your request, a copy of the comments submitted by the SHPO is enclosed. NEPA analyses involving Oak Flat would still require an analysis of impacts to cultural or historic resources, regardless of eligibility or listing status. Any decisions involving Oak Flat would still require compliance with other laws, regulations, and policies, including the National Historic Preservation Act (NHPA).

Question 7: In your testimony, you indicate that the Hazardous Fuels program utilizes the Hazardous Fuels Priority Allocation System (HFPAS) “to inform allocation decisions,” including “the likelihood that high intensity wildfires will intersect with residential areas and municipal water supplies.” Your testimony continues to state that once those priorities are

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

identified, the Forest Service adjusts them based on “other treatment and ecological objectives.” A memo titled “Risk Based Wildland Fire Management” from the USFS office of wildland fire dated October 10, 2014 states that the HFPAS is “no longer used for a variety of reasons.” Can you please confirm that despite this memo, the HFPAS is currently used? Can you explain what factors go into the prioritization system, and how those priorities are adjusted by other objectives? How often does the Forest Service use this prioritization system? Has it proven successful at targeting treatments at high priority areas? Please provide the current prioritized list of authorized hazardous fuel reduction projects.

Response: We continue to use a prioritization system for hazardous fuels allocation; however, the science and subsequent methods have evolved greatly since the original Hazardous Fuels Priority Allocation System (HFPAS) was developed. Beginning in 2009 we conducted an analysis we called HFPAS, approximately every other year. In 2014 we made substantive improvements and changes to the analytic methods, as outlined in the October 2014 memo, thus we no longer use the specific methods defined as HFPAS prior to 2014. The 2014 methods include updates from the previous HFPAS process such as being spatially explicit. The updated methods identify where on the landscape there is an intersection of high probability of large intense wildfire AND either residentially developed areas or important watersheds for municipal water supply. The original method relied instead on a scoring system which scored forests on attributes, including some of the same variables we currently use. Many of the data elements are similar and both used a national scale analysis. We use this information to inform the final allocation, but make adjustments based on additional factors such as the need for continuity in programs, maintenance of existing treatments, and capacity to complete risk mitigation work.

The HFPAS method is not used to allocate funding to particular projects. The national analysis informs the Regional allocations. The Regions can use the national analysis or their own process to inform Forest allocations. Forests then develop projects which are typically multi-year projects and contribute to more than one land management objective. Such projects are rarely “just” fuels projects and are often funded with a variety of Budget Line items to maximize restoration opportunities and fiscal efficiency across programs. Regions may also take into account additional information such as critical habitat or important cultural resources.

Although we do not typically consider individual projects at the national level, in 2015 the increase in the hazardous fuels appropriation allowed us to fund a number of priority projects. In selecting these projects we relied heavily on 2014 fuels allocation analysis to determine distribution of funds to the Regions and to select projects, submitted by the Regions, in forests having the highest risk to populations and watersheds, as identified by our 2014 analysis.

Questions from Senator Mazie Hirono

Question: Fire Borrowing Impacts on other DOI/FS Programs

I understand that the Forest Service and Department of Interior often rely on “fire borrowing,” where money is taken out of other discretionary accounts if fire suppression funds are depleted.

U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell

Can you indicate some of the specific programs within the Forest Service and Department of Interior from which “fire borrowing” occurs? How is it determined which programs will have funds withdrawn to cover emergency fire needs? Are the same programs routinely withdrawn from in cases of emergency or do the agencies rotate accounts from which they transfer funds from year-to-year in which fire borrowing is needed?

Response: The table below indicates the Forest Service accounts which were borrowed from in Fiscal Years 2012 and 2013. The Forest Service develops the fire transfer strategy after analyzing unobligated balances in discretionary, mandatory, and permanent accounts that may be available to support fire suppression activities. The same accounts are always analyzed; therefore, there is potential for the same programs to be impacted on an annual basis.

FOREST SERVICE HISTORICAL FIRE TRANSFER STRATEGY AMOUNTS (in millions)			
FUND TITLE (FUND)	DESCRIPTION	2013	2012
Capital Improvement and Maintenance (CMCM)	Discretionary appropriation that provides funds to preserve high-quality recreation opportunities, quality facilities, roads, and trails affords the public opportunities to interact with nature.	30	30
Research & Development (FRFR)	Discretionary appropriation that provides funds to develop forest management techniques that adapt to and mitigate the effects of climate change, particularly in those geographic regions of the United States where forest lands are most at risk.	5	0
National Forest Fund (NFNF)	Discretionary appropriation that provides funds for the stewardship and management of the 193 million acres of national forests and grasslands.	40	50
State & Private Forestry (SPSP)	Discretionary appropriation that provides funds for technical and financial assistance to landowners and resource managers to help sustain the Nation's urban and rural forests and protect communities and the environment from wildland fires, insects, disease, and invasive plants.	5	5
Land Acquisition (LALW)	Appropriated Receipt where funds come from the Land and Water Conservation Fund (L&WCF) to acquire lands within National Forest System boundaries and congressionally designated areas.	12	20
Knutsen-Vandenberg (CWKV)	Mandatory appropriation trust fund where funds are collected from timber sales to conduct sale area improvement work on timber sales areas on the national forests. Funds are used within timber sale areas to implement reforestation following timber harvest as well as other sale area improvements approved in the related environmental analysis.	170	160
Brush Disposal (BDBD)	Mandatory appropriation where purchasers of National Forest timber deposit an estimated cost to dispose of brush and other debris resulting from their cutting operations.	30	40

U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell

Purchaser Elect (PEPE)	Mandatory appropriation establishing a fund for small business timber purchasers to elect to pay the Forest Service to construct or reconstruct any permanent roads or bridges required by the timber sale. The timber purchaser must be classified as a small business operator, and the total estimated reconstruction and construction cost in the timber sale contract must exceed \$50,000.	20	15
Restoration of Improvements (RIRI)	Mandatory appropriation establishing a fund for improvement, protection, or rehabilitation of lands under the administration of the Forest Service. This fund receives monies from (1) forfeiture of a bond or deposit by a permittee or timber purchaser for failure to complete performance of improvement, protection or rehabilitation work required under the permit or timber sale contract or (2) the result of a judgment, compromise, or settlement of any claim, involving present or potential damage to lands or improvements.	183	60
Timber Salvage (SFSF)	Mandatory appropriation establishing a fund requiring purchasers of salvage timber to make monetary deposits in a designated Treasury fund to cover the costs for sale preparation and administration, and the engineering design and administration of any needed roads necessary for the harvesting of salvage timber.	5	20
Legacy (LGCY)	Appropriation established to fund projects published in the President's Budget. Final determination of funding levels is decided by Congressional direction.	5	0
Total		505	400

Question 2: Engagement with Communities in Hawaii

I'd like to follow up on your offer for additional information on local community outreach. During the hearing you noted that the Forest Service is engaged with local communities to address various wildfire needs, which includes addressing invasive species. Can you indicate which communities your agency is actively working with in Hawaii?

Response: For FY 2014 the State of Hawaii received \$989,000 to enhance firefighting capacity in communities throughout the State. State Fire Assistance, Volunteer Fire Assistance and Competitive Wildland Urban Interface grant funding was awarded by Forest Service, Pacific Southwest Region, Cooperative Fire Program to the Department of Fish and Wildlife, Hawaii Wildfire Management Organization, and county fire departments. These Federal Grant Funds are matched 1:1 by recipients and resulted in significant work accomplished through partnerships and collaboration between communities and local government.

Statewide activities included:

- Training over 175 firefighters to enhance fire protection for 145 communities,
- Maintenance and upkeep on 24 automated weather stations reporting fire weather conditions,
- Acquisition of personal protective equipment to ensure safety of firefighter,
- Fire Prevention and Education programs at community events and schools, and

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Chief Thomas Tidwell**

- Fire history and mapping tool support for better understanding of fire issue within the State

Maui County activities included:

- Purchase of firefighting equipment to better equip fire departments; and
- Development of Community Wildfire Protection Plans for West Maui, Central Maui, South Maui, and Molokai.

Hawaii County activities included:

- Development of a Community Wildfire Protection Plan for North Kona,
- Wildland Fire Personal Protective Equipment for all wildland firefighters, and
- Aerial Delivery Device (Bambi Bucket and accessories) for use with contract helicopters.

Kauai County activities included:

- Development of a Community Wildfire Protection Plan for Kauai County.

Oahu (Honolulu) activities included:

- Purchase of hand held radios to increase communication capacity between firefighters, and
- Maintenance of Walanae Kai fuelbreak to increase community protection from fire.

Janice K. Brewer
Governor

Bryan Martyn
Executive Director



Board Members

Alan Everett, Sedona, *Chair*
Walter D. Armer, Jr., Vail
Mark Brnovich, Phoenix
R. J. Cardin, Phoenix
Kay Daggett, Sierra Vista
Larry Landry, Phoenix
Vanessa Hickman,
State Land Commissioner

August 1, 2014

Nanebah Nez
Tonto National Forest
US Forest Service, USDA
2324 E. McDowell Road
Phoenix AZ 85006

Dear Ms. Nez:

The State Historic Preservation Office (SHPO) has reviewed the National Register of Historic Places Registration form (nomination) for Chichil Bildagoteel Historic/Archaeological District and offers the following observations and comments for consideration:

Major Comments:

- It is our understanding that this is a district nomination for the Chichil Bildagoteel as a TCP. Yet, there doesn't seem to be enough linkage between the archaeological sites and the traditional values against which these sites are evaluated to determine their status of contributing or non-contributing. For example, how do the archaeological sites demonstrate and support the use of Chichil Bildagoteel as a TCP? See our specific comments regarding pages 7 and 21-23 below.
- The sections on delineating the boundaries of the TCP need to be more thoroughly explained and cited. The considerations and criteria used to define the boundaries of the TCP needs to be described and supported.

General Comments:

*Be sure to make all the archaeological site descriptions consistent in terms, style, and completeness. Information should focus on what is significant for a site to be a contributor. For example, the description of site 02-1259 (p. 21) should make it clear that surface wiping and far rim folding are markers for historic Apache pottery.

*What makes Apache campsites significant at the local, state, or national level?

*Are any sites explicitly linked to the Apache Leap Battle site?

*The nomination should undergo a thorough technical edit for typos, formatting, etc.

Chichil Bildagoteel Historic/Archaeological District
 August 1, 2014
 Page 2 of 3

Specific comments:

- p.2: See above; shouldn't Public-State (ASLD) ownership box also be checked?
- p.3: Please see comments below regarding the number and type of Contributing and Noncontributing resources.
- p.3: I don't think "Apache place name location" falls under the Religion function or use.
- p.4: Are the bands listed part of the San Carlos Apache Tribe? Please clarify.
- p.5: Putting Oak Flat campground prominently in the Environmental Setting seems out of place.
- p. 5: What are the boundaries to the north and the south? See also p. 10; boundaries there are northwest and southeast (should be consistent).
- p. 5: Is "proscribed" the correct word for what is meant here?
- p. 5: Stating that ethnographic interviews have been conducted over 23 years is a very good point.
- p.5: The last sentence on this page ends with "(continued)" Continued to what page? Please clarify.
- p. 6: Shouldn't box A be checked under Criteria Considerations?
- p. 7: Re: Areas of Significance; see comments below (pages 21-23) on prehistoric and historic sites being contributors.
- P.8: One paragraph must be provided for each Area of Significance. Five areas are listed on page 7 but only two paragraphs are presented here.
- p.10: Are there sufficient UTM points given to adequately define the property? It is large and irregularly shaped.
- p. 10 More detail should be given for the Verbal Boundary Description. The Keeper may not have enough information to decide on the adequacy of the property's physical delineation. If additional detail would impinge on sensitive tribal information, this should be pointed out. I question the use of Arizona State Trust land to define part of the property, because this is an arbitrary, Euro American line, not a natural or traditional one. Why was ASLD land excluded from the boundary? Also, what is the significance of 4200 feet?
- p.11: More detail also needs to be given for the Boundary Justification. Can you provide more information on how and under what considerations the boundaries were negotiated with the San Carlos Apache Tribe? See comments above on Verbal Boundary Description, p. 10, as they are interrelated.
- p. 12: The Photo Log should be "continued".
- p. 13: In the Narrative Description, can you include Native American/Apache sources for additional information and perspectives?
- p. 15: The quotation in the middle of the page should be indented.
- p. 18: The quotation in the middle of the page should be indented.
- p. 19: I think it would be important to know how important the resources in Chichil Bildagoteel are to the Apache today; this would assist in providing an assessment of significance to the Keeper.

Chichil Bildagoteel Historic/Archaeological District
August 1, 2014
Page 3 of 3

p. 20: Is referring to other acts and executive orders appropriate in a nomination form?
p. 20: I think the form should say here and elsewhere that there are 38 "known" archaeological sites, based on cultural resources surveys. It also needs to be stated whether or not the whole Chichil Bildagoteel has been surveyed.
p. 21 - 23: See general comment above for page 7. It is unclear what criteria were used to determine if a given site was contributing or noncontributing other than themes 1-5. Some Hohokam sites are listed as contributors and some are noncontributors, and so are some Protohistoric/Apache sites. Do the Apache claim cultural affiliation to or descent from the Hohokam? There should be a general discussion of why certain sites, although they may be NRHP-eligible, are not contributors to this TCP. Next, just as there is an explanation of each "Contributing" site's significance relative to the TCP, there should be explanations for each "Non-Contributing" site as to why they are not being considered significant to the TCP.
p. 37: Please define "gowa".

A copy of the "National Register Federal Program Regulations" is enclosed to further assist you in submitting and nominating this property for listing in the National Register of Historic Places. Please refer to 60.9 regarding nominations by Federal agencies.

Sincerely,



Vivia Strang, CPM
National Register Coordinator
Arizona State Parks
State Historic Preservation Office

VS:vs

Cc: James Garrison, SHPO
Ann Howard, Deputy SHPO

Enclosures

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Dr. Stephen Pyne**

Questions from Chairman Lisa Murkowski

Question 1: You have stated that we can control very little of what is driving fire in our western wildlands, but that we can choose our response. What would you recommend we do in response to fire?

Reply: We cannot control the climate. We cannot undo over a century of fire exclusion on the scale and rate required. We cannot, except, maybe, selectively slow the resettlement of rural America by an urban out-migration. None of what is driving these causes lies within the control of the American fire community. But this does not mean we are helpless.

To begin with, America does not have a fire problem. It has many fire problems, and these problems often cluster in regions. We need a suite of responses. Some problems have technical solutions - we know how to keep houses from burning. Many, however, do not. They involve cultural values, conflicting beliefs about how we should use our public lands - about how, in brief, we choose to live on our national estate.

These are properly political issues that concern public assets and public safety; here, the issue is that we seem unable to resolve the conflicts, or even agree on a mechanism that all parties agree is legitimate by which to come to an agreement. So long as we are unable to resolve them in some working compromises, the fire community will have to fill the gaps. This has proved costly in money, resources, and even lives. The National Cohesive Strategy has identified many of the fire community's concerns and clustered them into three regions, but no mechanism exists (that I am aware of) to move those recommendations into field operations.

Begin by partitioning the different issues. In general terms we are dealing with three kinds of landscapes.

One is the clumsily named wildland-urban interface. This refers to a dynamic, fractal geography that is expected to expand over the coming decades. Its reach extends beyond its immediate grasp because it can influence for surrounding lands standards for air and water quality, watersheds, and so on. There are few means by which to slow the momentum of recolonization, but we can certainly prevent structures and communities from burning. I'll describe particulars in replying to Question 2.

A second is the legally wild or its equivalent in terms of specially protected nature preserves, as wilderness, parks, monuments, or habitats vital for threatened or endangered species. Here the methods available are fewer and must not inflict more damage than the potential fires. Ideally, such lands can absorb natural fires, and perhaps a ration of prescribed fires, but two issues plague fire managers. The first is whether, given altered climates and fuels, fires can be left to burn without destroying the values for which the lands were set aside. The second is how to keep such fires within their designated borders. There is an emerging sense among most (not all) environmental groups that the kinds of fires we are seeing threaten the foundations of these preserves and we need to intervene in some way. There is little agreement on what those measures might be.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Dr. Stephen Pyne**

The third landscape is the working landscape - what we might consider the middle landscape between the WUI and the Wild. In this case people are present but not as residents, and they engage - work with, not simply enjoy or pass through - the scene. Such lands remain often open to controversy about what "use" is appropriate and by what methods. The WUI and the Wild attract special attention. The working landscapes do not.

Each of these landscapes requires a different set of responses. Each, too, has its regional biases.

Obviously, any response needs money, but funding may assume different forms. For wild landscapes it may take the form of enhanced research and technology developments to better forecast expected fire (and smoke) behaviors. For WUI landscapes it may point to building capacity in local communities as first responders. For working landscapes it may require investments in thinning and burning. And so on.

My own belief is that what the American fire community needs most is clarity of mission. In 1960 the U.S. Forest Service was a benign hegemon that provided an institutional matrix for all the many pieces that made up the American fire scene. Today, there are hundreds of players - even thousands, if we consider volunteer fire departments and local burn associations - that must be integrated.

We need an arrangement that better identifies the rights, roles, and responsibilities for each. This was the intention behind the GAO's request for a "cohesive national strategy," which was included in the FLAME Act. How do states and the federal land managers, who have different charges, reconcile those differences? Who is responsible for protecting the I-zone? Likewise, how do we reward successes and penalize failures? And what constitutes a "failure" in fire management? An initial attack that fails to catch an ignition below 10 acres? A prescribed burn that slopes over a ridge?

We are talking about wildlands, not factory floors or office parks. There will always be ambiguities and uncontrollable factors. But without better rules of engagement, the default position will be to suppress and to spend whatever is available to take those flames off the evening news.

We cannot adopt a single standard throughout the country. But we can devise sharper rules of engagement for each of the tasks required. Without such resolution more money by itself will not produce commensurate results. My comments refer to basic funding, not to the matter of fire borrowing, which I will address in replying to Senator Wyden's question.

Question 2: In talking about the wildland-urban interface, you have said that we have put too much emphasis on the wildland half of the equation and not enough on the urban one. What did you mean by that? How should we go about managing fire in the wildland-urban interface?

Reply: In the 19th century America's towns burned as often as its countryside. This makes sense since cities and settlements were made of the same materials and so responded to the same dynamics of fire behavior. That record of conflagrations ended

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Dr. Stephen Pyne**

with the 1904 Baltimore and 1906 San Francisco fires. By applying building and zoning codes, and by improving fire protection infrastructure, urban fire became largely a thing of the past, like smallpox.

Over the past 40 years a new wave of settlement has picked up intensity. This one has been powered by an urban out-migration that is recolonizing formerly rural lands. In the West it can take the form of an interface, where public and private lands face each other across a boundary. In the East it can resemble an intermix, as houses sprout amid former agricultural lands. The problem was first identified in the late 1950s in Southern California. It acquired the label "wildland-urban interface" in the mid-1980s, again in Southern California. But it is no longer a California pathology. It has spread to Colorado, Texas, Oklahoma, Montana, and elsewhere. For a good while its narrative told of idiotic westerners building houses where the fires were. But increasingly, and if climate modelers are correct, it will become a national narrative in which the fires will go where the houses are. The houses most at risk are overwhelmingly in the southeast.

This is a correctable problem. It has been unnecessarily thorny because we have defined the issue by the wildland side of the equation. If we define the issue by the urban side, it is entirely tractable. We know how to keep houses from burning. We've known forever that combustible roofing is a bad idea. We now know better the role of adjacent vegetation and of ember attacks. All these vulnerabilities have technical solutions; we just need to apply them. If we identify the places at risk as exurban enclaves with peculiar landscaping, then we can bring existing codes, zoning, and so forth to bear. If we continue to identify the problem as a wildland one, then we will continue to expect wildland agencies to cope with a problem beyond their capability and we will lose houses.

There are some success stories, such as Firewise and equivalent local movements. And there are recent developments that apply to new construction. They do nothing to address a 30-40 year backlog of ill-conceived subdivisions. Without dramatic intervention, even if all new construction conforms to codes (not likely), we will lose many houses.

What to do? Evidence clearly points to houses themselves as the critical factor. They - or the home ignition zone - must be hardened to withstand fire. This doesn't mean concrete bunkers or nuked landscapes: it means using sensible materials and landscaping in ways that can be attractive but don't encourage threatening fire. It means codes that prevent overloading lots with construction, such that fires burn from one detached structure to the next (the kind of urban conflagrations we eliminated a century ago). It also means having firefighting capabilities to defend houses after the flaming front has passed.

The burden should clearly be on the local communities and jurisdictions. But outside very wealthy enclaves, few such communities have the capacity to cope by themselves. Here is where federal assistance can help, and already is, and this is where further funding would produce the greatest returns. What is unlikely to overturn the momentum is expecting the federal agencies to furnish primary protection. It is not even clear under what jurisdiction federal fire resources can and should be used.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Dr. Stephen Pyne**

As GAO reports have highlighted, the public and its elected officials expect over and over again that the feds (ie, the Forest Service) will serve as first-line fire protectors. Outside Southern California, the agencies are neither equipped nor tasked for this duty. Congress should clarify. At present the problem is, in my view, misdefined.

Question 3: In your testimony, you describe a strategy that is emerging that you call "resilience" whereby instead of attempting to directly control a fire there is an indirect reliance on confining and containing outbreaks. Can you explain what this would look like in terms of fire management operations?

Reply: U.S. Forest Service policy reforms dating back to 1978 allow for varied meanings of "control." It can mean containing or confining a fire rather than directly trying to extinguish it. Few units have used the option; among those that did the Gila National Forest in New Mexico achieved remarkable results. Critics and the GAO have repeatedly urged the agencies to expand the use of these techniques as a means of reducing costs, improving firefighter safety, and getting some useful fire on the land. In many respects the methods resemble those adopted for Alaska after ANILCA resolved the question of land ownership.

Such fires are not let-burns, and they vary - through funding, philosophy, and operations - from such similar approaches as prescribed natural fires and wildland fire use. Because they are a suppression option, they can use suppression funds, so they are not free, and may, for large fires, run up significant bills. But in the West they have been cheaper than either prescribed fire set-pieces or big-fire suppression. I characterize them as part of a "resilience" strategy since they accept the fires that occur and accept, too, the loss of some severely burned patches as the cost of business. They do not attempt to pre-fashion the landscape in advance of the coming changes.

Last year I witnessed and wrote an account of one such burn on the San Carlos Apache Agency (wrapped in a general history of fire on the reservation). It was posted on the Wildland Fire Lessons Learned Center [<http://www.wildfirelessons.net/viewdocument/?DocumentKey=4ac708d6-fd70-4aff-a1f9-6ba991ad5ec>]. I'm also attaching another essay on why I think boxing-and-burning is a way of the future.

Question from Senator John Barrasso

Question: Dr. Pyne, at the end of your testimony you use the familiar game of rock, paper, scissors to illustrate how the three fire strategies of Resistance, Restoration, and Resilience may each trump the other depending on the situation.

How do you see a mix of the three strategies best being used to match the circumstance?

Reply: The resistance strategy is appropriate for protecting communities and key assets. We will always need to fight fires we don't want. The question is what kind of suppression force we need and how it aligns with other strategies.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Dr. Stephen Pyne**

The U.S. has a full spectrum of options. The high-end, emergency service program is best epitomized by CalFire. Here the primary land use is urban sprawl, so an urban-model fire service makes sense. Yet the program is expensive (I doubt even California can really pay for it without emergency supplements); it can drive off other strategies such as restoration and resilience; and it has not shown it can manage fire. In a sense we created an ecological insurgency and we will not contain it by seasonal surges of engines and airtankers; we have to control the countryside. When the fires are blowing and going, we need firefighting forces. But this is not how we best cope with the problem.

Restoration - in the sense of getting lands and communities in a form that can accept fires or make fire suppression easier - is well exemplified by the Collaborative Forests Landscape Restoration Program (for lands) and Firewise (for communities). The premise is that, with enough effort, we can prepare our lands and exurbs before wildfires strike. The program makes sense for high-value sites such as municipal watersheds, exurban communities, heritage biotas (eg, sequoia groves), and so on. Where such landscapes exist, they make fire control easier and less expensive. The problem is that these projects are costly not only in money but in social and political capital. They take time. They are unlikely to cover more than a fraction of the lands requiring treatment or at a rate higher than the recent acceleration in burning.

Resilience is a strategy for the lands that will not be treated otherwise - which is likely the majority of public lands. It accepts some collateral damages. It works with wildfires as an alternative to pretreatments, yet when lands have been pretreated or burned, it is a good technique by which to promote reburning. Since reburns must be done in perpetuity, this is really the only reasonable approach possible over the long run. The issue is whether and where it is an alternative to restoration approaches. The materials I sent in answer to Senator Murkowski's Question 3 should help explain what I mean.

The *resistance* strategy is appropriate where we are dealing with cities or exurban enclaves. Even if houses are hardened, we still need firefighters to move in after the flaming front. An all-hazard model can also provide better service for post-fire cleanup and its social needs. There are a few federal locales where this strategy is suitable (such as Southern California), but mostly a federal investment would be best made to enhancing the capacity of local jurisdictions and fire departments.

The *restoration* strategy - relying mostly on prescribed fire and thinning - is appropriate where we have high at-risk landscapes such as ponderosa pine forests sprinkled with housing settlement, municipal watersheds, and critical habitat sites. The program will take time and capital, including investments in complex collaborations, but the potential damages are huge and even more costly. Clearly, this will be a strategically targeted program, not a universal one.

The *resilience* strategy is appropriate for the remainder of the public domain. It will expand significantly the amount of federal lands burned, though not all of it in ways managers might wish. It seems to me, however, the best working compromise. It will not apply to all fires, some of which must be fought aggressively from the onset. But we cannot pretreat all lands methodically and we cannot continue to try to suppress all fires. Alaska has used variants of these techniques since the early 1980s.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Dr. Stephen Pyne**

Question from Senator Ron Wyden

Question: In your testimony you talk about the three strategies to managing wildfire activities in our nation's forests: Resistance, Restoration, and Resilience. I agree that these goals are key components of managing forests and protecting communities against large wildfire events. But in order to perform the work to achieve resistance, restoration, and resilience, federal agencies need a way to fund that work.

How can federal agencies fund those efforts without fixing the way we budget for fires and freeing up funds for hazardous fuels reductions and other critical work in the forests, like the Wildfire Disaster Funding Act, which I introduced, would do?

Reply: I was asked to speak on my characterization of the three strategies I see in operation today, not on financing. Let me offer a few short prefatory observations, then try to speak directly to your question.

We have over a century of experience in financing fire operations, not only in the U.S. but in countries with cognate fire issues and in the record of European colonies that attempted state-sponsored forestry. The short answer is, no one has found a formula that accurately assesses the values at risk or the appropriate way to finance a fire program. It is only possible to value those parts that have existing markets (such as contracted timber berths or houses). The biggest breakdown occurs with the exceptional fire or fire season - the black swan, if you will. It blows away much of the work done over years or decades, and runs outside fiscal borders. The conundrum of the big fire continues to haunt all thinking about the subject.

The 1908 act that allowed for supplemental appropriations was a recognition that the Forest Service could not know in advance what the cost of its fires would be. The practice worked fine until the 1910 fire season increased the obligation more than 20-fold, to nearly a million dollars. The 1935 10 am policy that sought to control every fire by 10 am the following morning was not motivated by simple pyrophobia but a determination to rein in the costs of large fires. With the development of based fire-danger rating systems the emergency fire accounts were extended to include pre-suppression on the reasoning that early intervention would keep the overall costs down. The usual protocol was to plan for an "average worst" season, though again it was the beyond-average season that blew up plans. Regardless, the attempt failed - both suppression and pre-suppression expenses went up. The 1978 Forest Service reforms eliminated the use of emergency pre-suppression funds and upped the amount of budgeted funding in the belief that this would abolish the practice of supplemental funding. Still, some seasons spilled over, and Congress appropriated the difference.

What has changed is the dramatic rise in fire size, severity, and costs - and the unwillingness of Congress to continue off-budget supplementals. The rise in fire costs parallels a rise in the costs of other natural disasters over the past 15-20 years, as recorded by insurance claims (and those of re-insurers). This reality, plus the elimination

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Dr. Stephen Pyne**

of a surplus account from Forest Service logging contracts, created the fire borrowing crisis. All this is the latest incarnation of an old concern.

So, to address your particular questions.

First, fire borrowing must end. I believe that treating large wildfires as natural disasters is an apt solution, as your bill proposes. Undoubtedly, someone will find a way to game the particulars, but that can be addressed when and if it occurs. Besides, we are not dealing with a fixed problem but one that continually evolves. Our financing strategies must evolve with them.

Second, the costs of fire management are driven by policy. We should clarify responsibility for fire protection in the WUI. If the federal agencies are to be the responsible parties, then we will have to increase base budgeting significantly. If not, then the federal government can help local jurisdictions - as it does now - improve their capacity.

We should also explore the further use of confining and containing strategies for managing fires. Some fraction of these fires will surely escape control, cause damage, and ratchet up expenses. But the general cost of fire management should slide down.

I would add that we have consistently underpriced fire costs. Because fires do not occur on regular rhythms, we are always out of sync. We don't want to pay a lot and then have a subpar season. Then we don't want to pay a lot under emergency conditions to make up for the above-average season. This is, in brief, in my opinion, not a technically solvable problem, but it is a manageable one.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Question for the Record Submitted to Dr. Sharon Hood**

Question from Senator John Barrasso

Question: Dr. Hood, Wyoming has been heavily impacted by the mountain pine beetle. Your research documents how a tree's annual growth and resin duct size and production increase after thinning and low-intensity fires. In your testimony, you explain how trees with increased resin duct size were more likely to survive a bark beetle attack.

How does forest thinning increase the likelihood of low-intensity fires and beetle resistant trees? In your view, how much more thinning or forest restoration work needs to be performed within the Intermountain West to ensure ponderosa pine stands are best positioned to survive beetle attacks and encourage low-intensity fires?

Response: Wyoming has indeed been heavily impacted by mountain pine beetle, which has caused mortality on over 3.65 million acres of forests in Wyoming during the recent 2000s outbreak (U.S. Forest Service 2011). Most mortality has occurred in lodgepole pine forests. Specific treatment prescriptions and responses will depend on forest type.

How can forest thinning increase the likelihood of low-intensity fires?

Thinning is a general term for any treatment that reduces tree density, but there are many types of thinning treatments based on one's specific objectives. Not all thinning treatments will favor low-intensity fire. Low thinning and free thinning are the silvicultural treatments that can increase the probability that a fire will burn as low-intensity. Low thinning, or thinning from below, removes smaller trees in the lower crown position classes to encourage faster growth and higher tree vigor in the larger, taller trees. Free thinning removes trees to control stand spacing and to favor desirable trees.

Low thinning and free thinning can increase the probability of low-intensity fire by reducing the available canopy fuel than can burn during a fire. This is achieved because low and free thinning treatments (1) remove smaller trees that can act as ladder fuels and (2) increase the spacing between tree crowns in the stand. Reducing ladder fuels and increasing crown spacing makes it more difficult for a surface fire to transition to a crown fire by changing two fuel properties: canopy base height and canopy bulk density.

Thinning treatments that remove smaller trees reduce ladder fuels and increase the canopy base height of the stand. Canopy base height is the lowest height above the ground at which enough canopy fuel exists that could support a passive crown fire (i.e., a fire that torches the needles of individual trees or small groups of trees) (Scott and Reinhardt 2001). In forests with high canopy base heights, it is much harder for fires to transition from a low-intensity surface fire to a passive crown fire because there is not enough canopy fuel in the lower portions of the forest canopy to allow the fire to propagate vertically to the upper portions of the canopy.

Thinning treatments that increase the spacing between tree crowns decrease canopy bulk density. Canopy bulk density is a measure of how tightly packed the fuel is in the upper stratum of the forest. If enough fuel exists in the canopy (i.e., canopy bulk density is high), then a passive

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Question for the Record Submitted to Dr. Sharon Hood**

crown fire can transition to an active crown fire. Active crown fires are ones in which a fire spreads from tree to tree through a forest. These fires are the most difficult to control and the ones that pose the highest risk to human safety. Thinning treatments that increase spacing between tree crowns reduce canopy fuel loadings, thereby reducing canopy bulk density, and making it more difficult for a passive crown fire to transition to active crown fire and spread through the forest.

By increasing canopy base height and reducing canopy bulk density, thinning treatments reduce fuel that support crown fires. Removing ladder fuels makes it harder for passive crown fires to occur and increasing tree crown spacing makes it harder for an active crown fire to occur.

How can forest thinning increase the likelihood of bark beetle resistance?

Bark beetles must first deplete a tree's defenses in order to successfully reproduce inside the tree. Bark beetles can only accomplish this task by "mass attacking" a tree, in which bark beetles of the same species coordinate attack timing through pheromone communication. The number of beetles required to overwhelm a tree's defenses depends on the defense level of the tree. Trees with low defenses are more easily attacked because fewer bark beetles are required to successfully attack and kill the tree. That is why when beetle populations are low, typically only smaller, lower vigor trees with low defenses are attacked. When a bark beetle population increases to outbreak levels, there are enough beetles in a stand to overwhelm trees with high defenses. At this stage massive tree mortality can occur and tree defenses may not matter as much (Boone et al. 2011). This underscores the need to proactively implement treatments before outbreaks occur to limit bark beetle population growth, rather than during an outbreak.

Forest thinning can increase resistance to bark beetles through a combination of (1) increasing individual tree defenses and (2) decreasing bark beetle attack efficiency and communication effectiveness at the stand and forest levels.

Pine tree defenses include morphological and chemical components. These defenses vary based on tree genetics, but also on environmental conditions such as weather, fire, and water, light, and nutrient availability (Ryan et al. 2015). Thinning increases resin ducts, a morphological defense, and changes resin quality and flow, a chemical defense (Hood 2014). Trees with more resin ducts are more likely to survive bark beetle attack (Hood et al. 2015). The quality of tree resin determines its toxicity to beetles and affects pheromone communication (Raffa 2014). At the individual tree level, thinning when bark beetle levels are low can help keep beetle populations in check by increasing tree defense levels and removing low vigor trees. This limits the number of available hosts in a stand that the beetles can attack because trees with low defenses are removed and there are not enough beetles to overcome the increased defenses of the remaining trees.

Thinning also impacts stand and forest resistance to bark beetle attack by changing species composition, tree microclimate, and growing conditions (Fettig et al. 2007, Fettig et al. 2014). Each bark beetle species is host specific and can only attack one to a few tree species. Therefore, thinning can increase resistance to a given bark beetle species by removing susceptible tree host

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Question for the Record Submitted to Dr. Sharon Hood**

species. Thinning affects microclimate of remaining trees by increasing air temperature and windspeeds. Increased temperatures can affect beetle development rates that could disrupt emergence timing or make them more vulnerable when overwintering. Because beetles must mass attack trees, it is important that they emerge from attacked trees at approximately the same time to have enough beetles in the area to successfully attack new trees. Beetles that overwinter during development are more sensitive to cold at certain stages of their life cycle and development rate is highly dependent on temperature. Increased windspeeds can disperse bark beetle pheromones and reduce the beetle's ability to detect pheromones that signal beetles to mass attack trees. Thinning also increases water, light, and nutrient availability to the remaining trees in a stand. This allows trees to allocate more resources to defenses.

How much more thinning or forest restoration work needs to be performed within the Intermountain West to ensure ponderosa pine stands are best positioned to survive beetle attacks and encourage low-intensity fires?

This is a difficult and complex question to answer. The 2011 Western Bark Beetle Strategy estimates that approximately 9 million acres across all land ownerships in the Western U.S. are available for treatments to increase forest resilience to insects and disease (U.S. Forest Service 2011). These treatments should reduce stand density, increase age class and structural diversity across the landscape, and favor species better adapted to drought.

Many of the treatments that increase resistance to bark beetles will also increase the probability of low-intensity fire. One important difference is that mechanical treatments designed to reduce high-intensity fire must also treat any surface fuels created during treatment implementation. Not treating surface activity fuel after thinning treatments can increase the chance of high-intensity fires.

Appropriate treatment options depend on proximity to human development and forest type. Areas close to human development may require treatments that are not aligned with ecological objectives, but solely focus on increasing human safety. Treatments on lands away from human development should aim to increase ecological resilience to a variety of threats, including uncharacteristic high-intensity fire, bark beetle outbreaks, and drought. To foster low-intensity fires, vegetation types with historical low-severity fire regimes of fire return intervals less than 35 years should receive priority, as these are the lands most affected by past fire suppression activities. This applies to 34% of land (1.73 million km²) in the U.S. (Schmidt et al. 2002). To meet treatment targets, it will be necessary to employ a variety of tactics, including mechanical treatments, prescribed burning, and allowing wildfires to burn for resource benefit (U.S. Departments of the Interior and Agriculture 2014). Mechanical treatments alone are not ecologically appropriate in all areas, nor feasible across such a vast land area (North et al. 2012, Moritz et al. 2014). It is important to note that bark beetles are native insects and have caused outbreaks for thousands of years in coniferous forests and that some vegetation types are inherently prone to- and ecologically adapted to- burning as high-intensity fire.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Question for the Record Submitted to Dr. Sharon Hood**

References

- Boone, C. K., B. H. Aukema, J. r. Bohlmann, A. L. Carroll, and K. F. Raffa. 2011. Efficacy of tree defense physiology varies with bark beetle population density: a basis for positive feedback in eruptive species. *Canadian Journal of Forest Research* 41:1174-1188.
- Fettig, C. J., K. E. Gibson, A. S. Munson, and J. F. Negrón. 2014. Cultural practices for prevention and mitigation of mountain pine beetle infestations. *Forest Science*:1-14.
- Fettig, C. J., K. D. Klepzig, R. F. Billings, A. S. Munson, T. E. Nebeker, J. F. Negrón, and J. T. Nowak. 2007. The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of the western and southern United States. *Forest Ecology and Management* 238:24-53.
- Hood, S., A. Sala, E. K. Heyerdahl, and M. Boutin. 2015. In Press. Low-severity fire increases tree defense against bark beetle attacks. *Ecology*.
- Hood, S. M. 2014. The impacts of removing wildfire on *Pinus ponderosa* resistance against *Dendroctonus ponderosae*. Dissertation. University of Montana.
- Moritz, M. A., E. Batllori, R. A. Bradstock, A. M. Gill, J. Handmer, P. F. Hessburg, J. Leonard, S. McCaffrey, D. C. Odion, T. Schoennagel, and A. D. Syphard. 2014. Learning to coexist with wildfire. *Nature* 515:58-66.
- North, M., B. M. Collins, and S. Stephens. 2012. Using Fire to Increase the Scale, Benefits, and Future Maintenance of Fuels Treatments. *Journal of Forestry* 110:392-401.
- Raffa, K. 2014. Terpenes Tell Different Tales at Different Scales: Glimpses into the Chemical Ecology of Conifer - Bark Beetle - Microbial Interactions. *Journal of Chemical Ecology* 40:1-20.
- Ryan, M. G., G. Sapes, A. Sala, and S. M. Hood. 2015. Tree physiology and bark beetles. *New Phytologist* 205:955-957.
- Schmidt, K. M., J. P. Menakis, C. C. Hardy, W. J. Hann, and D. L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ft. Collins, CO.
- Scott, J. H., and E. D. Reinhardt. 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. Res. Pap. RMRS-RP-29. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- U.S. Department of the Interior and U.S. Department of Agriculture. 2014. The National Strategy: The final phase of the development of the National Cohesive Wildland Fire Management Strategy.
- U.S. Forest Service. 2011. Western Bark Beetle Strategy: Human Safety, Recovery, and Resiliency.

U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Mr. Bob Eisele

Questions from Chairman Lisa Murkowski

Question 1: In your testimony you seem to be saying that our wildfire problem is actually not a fire problem at all but a fuel problem. You also seem to be saying that the Forest Service's current strategy is actually making the problem worse. Do I have that right? Can you explain why and also elaborate on what you think the Forest Service should be doing?

Yes Senator, you have it right.

The present strategy of almost total wildfire suppression has led to a buildup of vegetation greatly surpassing levels that existed over the past 10,000 years. The vegetation thrives in wet years and dies back in dry years, leaving large amounts of dead woody material on the ground, dead branches on the trees, and more trees than are sustainable. It is the dead fuel and overstocked forests that support these enormous landscape scale fires.

In the absence of fire suppression, small fires at frequent intervals removed the dead fuels, pruned the lower branches, and removed most of the young trees. Fires in these forests remained on the ground, even during extreme weather events. Crown fires almost never happened and spread rates were much slower. Fires halted when they encountered recently burned areas, streams, or rock outcrops.

By suppressing almost all fires, we have set the stage for catastrophic large "stand-replacement" fires.

Unfortunately, just stopping fire suppression will not resolve the issue. Pre-European contact forests limited competition among trees by thinning the forest with fire. Young trees are vulnerable to fire in the first 10-20 years of age. Once trees reach maturity, the ground fires are rarely fatal. The result of long term fire suppression is an overstocked forest of unhealthy trees competing for limited moisture and nutrients. Many forests in this condition burn as crown fires; others burn as ground fires that don't kill enough trees to return the forest to a more natural condition.

The Forest Service is doing the right thing in mechanically thinning forests followed up by burning the forest understory. The issue is the scale of the efforts. The land management agencies are treating about two percent of the forests annually which equates to a fifty year interval. Most forests had a ten year fire interval prior to the full suppression era. Add to that the lands where mechanical thinning is impractical (too steep or rocky) or prohibited (wilderness, roadless, etc.) and it is clear that much more needs to be done.

The recent large fires leave behind thousands of acres of logs and snags that represent available fuel for the next fire. There are large areas with no conifer (pine, fir, etc.)

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Mr. Bob Eisele**

regeneration due to the total destruction of all trees. Without some surviving trees, the seed source for future forests is absent.

These stand replacing events exceed in size and scope pre-suppression fires and risk type converting existing forest to some different land cover.

These solutions need to be implemented:

- *Double (at least) the number of acres treated under the Hazardous Fuels Program.*
- *Modify NEPA to simplify and expedite the process for forest fuel management actions.*
- *Revisit criteria for selecting projects to include cost per acre, forest health, climate impacts, and risk of stand replacement fire.*
- *Strategically Placed Landscape Treatments (SPLATS) methodology should also be part of selecting areas for treatment.*
- *Use recent burns to hold prescribed burning operations.*
- *Develop a long range plan on each forest for vegetation management actions and revise it on a regular basis to include new wildfires.*

Question 2: Given your experience in fire operations, what do you suggest be done to get a handle on fire suppression costs?

"For every complex problem there is an answer that is clear, simple, and wrong." H. L. Mencken.

Fire managers, like all managers, are incentivized to take actions that satisfy the desires of their agency, the government, and the public. Presently, cost takes a back seat to the public's, and therefore the elected officials, desire to extinguish all fires quickly. The public, especially the urban public, has been trained to expect a massive armada of fire engines, bull dozers, and aircraft attacking the fire and protecting their homestead. Simultaneously, environmental organizations pressure managers to limit mechanical equipment use, keep retardant away from water sources, and protect endangered species and archeological sites. Lives and property may or may not be at stake but are always at the top of the priority list. Crews are performing dangerous, arduous tasks, 24 hours a day, but zero mishaps are expected. Local, tribal, and state governments have needs, real and imaginary. The media must be informed in a timely and accurate manner, lest they report rumor and hearsay. Air pollution concerns from smoke add more complexity.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Mr. Bob Eisele**

Community activists have demands, some of them unreasonable. Emergency equipment contractors want to be hired. If spending exceeds five (?) million on suppression, an automatic audit follows. And all these demands and concerns exist in real time - hours and days.

The present solution is the imposition of a myriad of well-intentioned rules and procedures that do more to hamstringing the managers and may even result in increased costs. At the same time, the public's expectation is for more of everything.

- *Increase funding for hazardous fuel programs. Areas that have had hazardous fuels treatment or recent burns do not generate expensive mega-fires.*
- *Educate the public to understand that some fires must be allowed to burn where they do not endanger life and property and that other fires cannot be stopped.*
- *Educate the public to the risks presented by overgrown public and private lands*
- *Develop fire spread computer models that can validate the tactics and strategy employed by fire managers.*
- *Develop fire spread computer models that can validate the effectiveness of air resources and justify their use/non-use on large fires. Educate the public to the benefits, limitations, and risks of aircraft use on fires.*
- *Reward fire managers and their superiors for frugality and protect them from perceived failures. In other words, back them up.*
- *Cost share fuels treatment within 500 feet (?) of development and minimize the permitting burden for residents to conduct fuel modification on federal land.*
- *Eliminate the necessity for fire managers to obtain personal liability insurance for good faith actions they take in the suppression of fires.*
- *Allow federal agencies to conduct hazardous fuels management activities on parcels of private lands within the forest where practical and necessary. Simplify the agreement process between federal and state, local, tribal, and private lands for hazardous fuels management.*

I would be happy to discuss these recommendations with you or anyone that you suggest.

Question from Senator Ron Wyden

Question: Research has shown that healthy forests that have received hazardous fuels treatments are much more resistant to the devastating effects of wildfires, which is especially important when it comes to protecting houses and towns from fast moving and dangerous fires. As I'm sure you know from your experiences, there isn't going to be just one solution to this fire problem, agencies, communities, federal and state government, are all going to have to come together to address the many problems which lead to destructive fires.

**U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Questions for the Record Submitted to Mr. Bob Eisele**

What are some of the ways that local, state, and federal interests can collaborate on projects that will improve their ability to prevent and suppress future wildfires?

Here are some ways to for all parties to limit the impact of wild fire:

- *Prevention of all fires is not practical. Ignitions are plentiful and random. Thinning, followed by burning of forests prevents massive fires. Fires do not respect artificial boundaries. Therefore, hazardous fuels projects must be on a landscape scale, usually involving federal, state, tribal, local, and private lands. The federal government could provide cost matching grants.*
- *Encourage the use of biomass energy to heat and power homes and businesses with vegetation from hazardous fuels projects to offset the cost of thinning.*
- *Establish a grant and training program for "slip in pumper units" for structure protection. These would be stored and maintained until needed; then installed in a government pickup truck and staffed by one local government employee (such as Parks, Water Dept., etc.) and one trained fire fighter for the express purpose of following a fire and relieving fire engines to actively protect structures in other areas.*
- *Increase training in structure protection and wildland operations for local government forces.*
- *Linking the amount of "Payments in Lieu of Taxes" (PILT) (Public Law 97-258) to the enforcement of standardized Wildland Urban Interface (WUI) building codes and defensible space regulations in and adjacent to federal wildlands. Those in compliance would get more money while those out of compliance would get less.*
- *Encourage the establishment of local Fire Safe Councils, grassroots community-based organizations whose mission is to make their area less vulnerable to catastrophic wildfire. Priority should be based on fuel age surrounding the area and small towns or subdivisions of large towns.*
- *Encourage Community Wildfire Protection Plans (CWPP). These have been shown to be successful in small communities and subdivisions of larger ones. Homeowners prepare the plan, organize community "chipping days," and help each other maintain defensible space in their communities.*
- *Encourage adoption of Building Codes similar to the International Wildland-Urban Interface Codes (<http://publicecodes.cyberregs.com/icod/iwuic/2012/index.htm>) by appropriate governments.*
- *Adopt model defensible space laws for use by state, tribal, and local governments.*
- *Enforce forest defensible space laws.*

U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Question for the Record Submitted to Mr. Bruce Hallin

Response to Question from Senator Mazie Hirono

Question: *Impacts of Wildfire and Forest Health on Watersheds*

You note that watershed health is negatively impacted by deteriorating forest health and wildfire activity. The ecological services that Hawaii's watersheds provide to our environment and people are becoming increasingly understood. Whether it is providing clean water to our children or keeping sediment out of our streams and oceans, our watersheds, the sources of our water, must be protected.

Can you touch on the sense of urgency you feel for addressing watershed health in our nation's forests, especially with the growing threat of drought our nation is experiencing?

Senator Hirono, thank you for your timely question.

The urgency of completing hazardous fuels reduction and forest restoration treatments on our national forests, particularly in the western United States, cannot be overstated. A dangerous combination of hazardous fuels buildup, drought, and disease threaten our cherished forest resources including the runoff and storage of our most precious resource – water. The risk compounds with each passing fire season and we cannot afford not to take action. In Arizona, we know all too well the consequences of inaction—since 2000 over 2.0 million acres of lands within or near SRP's watershed have been impacted by wildfire.

The combination of unnaturally dense vegetation and extended drought in Arizona has created conditions on our national forests where trees are more stressed, unhealthy, and less resilient to disease and insect infestation. Although fire is necessary for a healthy resilient forest ecosystem, introduction of fire into our unhealthy forests has catastrophic results. Catastrophic fires burn higher into forest crowns, burn hotter, and destroy all vegetation including large, medium, and small trees. In addition, the intense heat sterilizes soils which act to prevent post-fire forest recovery. The effect on watersheds is dramatic. Without vegetation to absorb moisture and hold soils in place, burned slopes increase the intensity of flooding and erosion of soils, ash, and other debris that cascade into creeks and rivers that feed our water storage reservoirs. The flooding and erosion decreases the life of the reservoir by accelerating sedimentation. In addition, the debris and ash negatively impact water quality for downstream municipal water users – all costing millions of dollars. At risk SRP reservoirs alone store a municipal water supply for over two million residents of metropolitan Phoenix.

The C.C. Cragin Reservoir located in Northern Gila County provides a good example of the risk these conditions create to a significant municipal water supply. The entire 64,000 acre watershed that feeds the C.C. Cragin Reservoir consists of pine and mixed conifer forests managed by the Coconino National Forest. These forests are overgrown with hazardous fuels, extremely dry due to our extended drought, and are at

U.S. Senate Committee on Energy and Natural Resources
May 5, 2015 Hearing: Wildfire Management
Question for the Record Submitted to Mr. Bruce Hallin

high risk for catastrophic wildfire. The C.C. Cragin Reservoir stores a municipal water supply for the Town of Payson, other Northern Gila county communities, Native American communities, and metropolitan Phoenix. The communities' investment in C.C. Cragin and related infrastructure is significant – estimated at over \$60 million. SRP recently improved the reservoir storage infrastructure and delivery system. The Town of Payson will invest millions to build a water treatment plant and pipeline to serve the Town and surrounding communities. One catastrophic fire to the C.C. Cragin watershed would not only destroy our investment, but we would spend millions more cleaning debris, ash, and sediment from the reservoir.

Through hazardous fuels reduction and forest restoration treatments, watersheds are more resilient to drought and the impacts of wildfire. Healthy forests regulate the timing and predictability of runoff, support springs and ecosystems that sustain our watersheds and protect wildlife habitat. SRP has made a long term commitment to actively work with our State universities to better understand the impacts that hazardous fuels reduction and landscape scale forest restoration efforts are having on SRP's watersheds.

In summary, the impact of drought on the health of our forests is mitigated by thinning and restoration treatments. In Arizona, trees in a natural open forest environment are healthier and better able to withstand periods of drought and resist insects, disease and catastrophic fire. To protect these precious resources, immediate action is now needed. We cannot afford further delays in moving forward with forest restoration efforts. Streamlining the extensive analysis and steps needed to comply with the National Environmental Policy Act and Endangered Species Act is imperative to ensure timely treatment of our forests. Eliminating the "fire borrowing" issue and providing dedicated and sustained funding for forest restoration projects is critical for the US Forest Service to carry out its forest management functions. Without immediate action to thin unhealthy forests and reduce fire risk, each fire season that passes will compound these impacts to our drinking water supplies and forest lands.

Thank you once again for your insightful question and concerns regarding the health of our national forests.



The voice of fish and wildlife agencies

Hall of the States
444 North Capitol Street, NW
Suite 725 • Washington, D.C. 20001
Phone: 202-624-7890
Fax: 202-624-7891
E-mail: info@fishwildlife.org
www.fishwildlife.org

March 26, 2015

The Honorable Mitch McConnell
Majority Leader
U.S. Capitol Building (Senate)
Room: S-230
Washington, DC 20510

The Honorable Harry Reid
Minority Leader
U.S. Capitol Building (Senate)
Room: S-221
Washington, DC 20510

The Honorable John Boehner
Speaker of the House
U.S. Capitol Building (House)
Room: 232
Washington, DC 20515

The Honorable Nancy Pelosi
Minority Leader
U.S. Capitol Building (House)
Room: 204
Washington, DC 20515

Dear Majority Leader McConnell, Minority Leader Reid,
Speaker Boehner, and Minority Leader Pelosi:

I am writing as the President of the Association of Fish and Wildlife Agencies (Association) with regards to the important issue of National Forest Conservation. The Association represents the collective policy and legislative interests of the fifty state fish and wildlife agencies.

On a personal note, I am the Director of the Arizona Game and Fish Department, as well as a 40 year career employee of that agency. I have witnessed firsthand the effects of catastrophic wildfire on forest ecosystems in the Southwest. I have also witnessed the dramatic increase in wildfire fuel loads that have resulted from the loss of capacity to perform forest health management due to increasingly costly practice of "fire borrowing." I can attest to the importance of solving the dilemma of forest health conservation funding through legislation.

State fish and wildlife agencies have a strong partnership with the U.S. Forest Service in advancing science-based habitat management and fish and wildlife surveys as well as access to wildlife-dependent recreation on the National Forest System. Unfortunately, for over a decade, these mutual interests have been compromised by the need to redirect non-fire programmatic funds to fire suppression efforts, resulting in delayed implementation of forest health and conservation practices, access projects, and management of invasive species to reduce wildfire cycles. Indeed, in recent years fire suppression costs have consumed nearly 50 percent of the Forest Service's operational budget annually.

Page 2

This is a chronic issue and one for which the Association has advocated for systemic remediation. Unto that end, we fully support a bipartisan approach that ends "fire borrowing" and are encouraged by the bipartisan discussion generated by both the Wildfire Disaster Funding Act (S. 235 and H.R. 167) and the FLAME Act Amendment (S. 508).

Both approaches are intended to adequately fund fire suppression needs. We understand that the Wildfire Disaster Funding Act would alleviate reliance on appropriated Forest Service funds by creating a natural disaster (i.e., fire) funding construct, treating catastrophic wildfires similar to other natural disasters such as hurricanes, tornadoes and floods. With the implementation of such a model Congress should also direct the Forest Service to deliver planned, sustainable forest management programs to the benefit of fish and wildlife resources and the American public. The FLAME Act Amendments would achieve a similar end through the direct appropriation process, at the level of full funding of the fire suppression need, to the U.S. Forest Service.

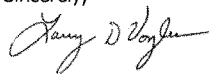
Regardless of the funding mechanism, what is inescapably essential is that enhanced funding is needed and that any enhanced funding capability must include provision for adequate funding of proactive forest health management. Prevention of catastrophic fires by reducing excessive fuel loads through proactive forest health management and conservation must be an integral component of any resulting bipartisan legislation if the future of our National Forests is to be secure.

We are fully cognizant of the considerable policy implications of the competing schools of thought surrounding this effort; however time, quite simply put, is not on our side. Since 2000 I have witnessed catastrophic wildfires that have burned over four million acres of our national forests in the Southwest (Arizona and New Mexico) alone. Western forests provide watersheds, and forest resource benefits essential to the economies of tens of millions of citizens living in the western US, constituting one of the largest economies in the world. Some burned areas have experienced such complete type conversions that the valuable ponderosa pine forests will never return.

The policy issues are significant, but the discussion must be tempered with an understanding of the exigent nature of the impending forest health crisis.

Thanks in advance for considering this input. If I, on behalf of the Association of Fish and Wildlife Agencies, can in any way facilitate discussions aimed at developing consensus legislation, I pledge to commit all my energies to your service.

Sincerely,



Larry D. Voyles
President, Association of Fish & Wildlife Agencies
and Director, Arizona Game and Fish Department

Testimony of Michael Caplin

May 19, 2015

Chair, Honorable Lisa Murkowski
 Ranking Member, Honorable Maria Cantwell
 Senate Committee on Energy & Natural Resources
 304 Dirksen Senate Building
 Washington, DC 20510

Transmitted via email attachment to darla_ripchensky@energy.senate.gov

Re: Testimony to be included in the record of the hearing on "*The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015.

Dear Chair Murkowski, Ranking Member Cantwell, and members of the committee:

Thank you for this opportunity to provide testimony for the record.

After watching the video of the hearing I am encouraged by some of what I heard, but am also concerned.

I was encouraged to hear that there seems to be bipartisan if not unanimous recognition on the Committee that there is a serious problem of unnatural and hazardous accumulations of wildfire fuels due to over 100 years of working to suppress wildfires, and that this presents a severe threat to lives, property, and resources.

I was also encouraged to hear that there seems to be similar recognition that under current laws and policies the problem is not being adequately addressed, and as a result the problem is literally growing worse each year.

I was further encouraged to hear acknowledgement of the problems of analysis paralysis and fear of litigation on the part of federal land management agencies.

However, I was concerned when I heard the very limited changes to law being proposed to address the problems, and by the lack of broad expression of support for even those nominal changes.

The critical step that needs to be taken to avoid the threat of litigation and resulting paralysis is to change all applicable laws so they cannot be used to support litigation to block this important work, not just one law, or a few. Amending all applicable laws to facilitate and incentivize the work is what it needed.

It is so clear that step is needed that the recommendation has been included in the "National Comprehensive Wildland Fire Management Strategy: Phase III, Western Regional Science-Based Risk Analysis Report," which states at page 6 (emphasis added),

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

Examine legislative related barriers that are impeding implementation of collaboratively developed landscape health related projects and pursue reform of the existing process to increase our effectiveness in active forest and rangeland management. (e.g., Endangered Species Act, Equal Access to Justice Act, National Environmental Policy Act (NEPA)).

Though more obtuse, "The National Strategy: The Final Phase of the Development of the National Cohesive Wildland Fire Management Strategy", effectively restates the same concept in its conclusion at page 73, saying,

By establishing national priorities and ensuring alignment of programs, policies, regulations, and actions to national direction, meaningful reductions in risk are possible through concerted, collaborative implementation.

There are many federal laws that can act to hinder or block the important work of reducing hazardous accumulations of hazardous wildfire fuels to safer more natural levels, and many state and local laws as well.

It is critical for the Committee to understand that federal laws can hinder or block not only the ability for federal agencies to perform this much needed work, but also state and local governments and private individuals.

I was also concerned to not hear substantial acknowledgement that the problem is so big, over so much land area, that the federal government cannot afford to address the problem, and that it will require new ways of thinking about how federal lands should be maintained.

Senator Franken's comments on the need to find ways to monetize/commercialize the cleanup by selling biomass for power production were on point to that issue, but would likely not be workable for remote areas not near biofuel power plants, where transportation costs could make it unfeasible. Perhaps small portable bio generator plants could be used, so transportation is in the form of electrons through power lines.

I was further concerned that I did not hear critical aspects of the problem raised at all. For example I heard no mention of the multiple threats to our national security as a result of our country's failure to adequately maintain areas to be prepared for wildfires.

Comprehensive changes, to all federal laws that can act to hinder or block this work, are needed to allow and facilitate addressing the problem of hazardous accumulations of wildfire fuels, on federal, state and private lands, and comprehensive changes to state and local laws are needed as well.

Wildfires fueled by unnatural accumulations of wildfire fuels do not recognize political boundaries or land ownerships. They are equal opportunity destroyers. They threaten equally

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

the lives and homes of members of all political parties, people of all races and income levels, and species and habitat that are protected along with those that are not protected.

You can see the faces and read about the lives of some of those who have been killed by wildfire in a document about the 2003 Southern California Fire Siege, which started when a lost hunter started a signal fire in the Cleveland National Forest, which then spread outside the forest to private land. When it was over 23 lives had been lost and 3,710 homes destroyed.
<http://nsjfire.org/wp-content/uploads/2014/04/Faces-20031.pdf>

In this testimony I propose *The Comprehensive Wildfire Preparation Facilitation Act of 2015*, to amend all federal laws that act to hinder or block preparing for wildfires to clearly exempt from their application wildfire fuel reduction work by all levels of government, and by individuals, both before wildfire starts and during wildfires, and to remove land that is topographically suitable for firebreaks or fuelbreaks from their application.

I propose changes to specific laws, and expect there are additional laws I am not aware of that also need changing.

How is it that I came to the point of writing this testimony and its proposals?

I have invested much time on the subject of this hearing since 2008, when the Basin Fire, which was started by lightning inside the Monterey Ranger District of the Los Padres National Forest, threatened our lives and home and the lives and homes of hundreds of our neighbors in our heavily overgrown rural community that has not experienced wildfire in some locations for over 50 years, in some locations for almost 100 years, and in other locations not in the recorded history of fires.

After the Basin Fire I investigated why it was that the Basin Fire was allowed to burn over the historic firebreak inside the national forest, which had been used to protect our community for decades from past wildfires that had started in the national forest.

I learned that multiple wilderness expansions to the Ventana Wilderness in 1978, 1984, 1992, and 2002 had moved wilderness up to and over the location of the historic "peripheral fuelbreak" on the perimeter of the Monterey Ranger District, which had purposely been left out of wilderness when the Ventana Wilderness was first created in 1969.

I learned that the 2002 wilderness additions were intentionally designed to block fuelbreak projects the Forest Service proposed in 2001 — including a project that would have helped protect our community from the Basin Fire. I discuss this issue in detail below, with documentation.

I learned about community wildfire protection plans, and their remarkable role giving small communities a voice to make recommendations on how federal lands should be managed to help protect them from wildfires.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

I learned about the benefits and weaknesses of the Healthy Forests Restoration Act (a weakness being that its benefits are negated by wilderness, i.e., 16 USC § 6512(d)).

I became involved in the process of drafting the Monterey County Community Wildfire Protection Plan (CWPP), and volunteer as a director on the board of a non-profit fire safe council, working to help solve the problem of hazardous accumulations of wildfire fuels in our county, which is in the highest category of risk for wildfires and need for treatments in the nation (see Exhibit 1).

I have watched as the Forest Service has slowly worked to implement fuelbreak recommendations in the CWPP, but has been delayed for years by the National Environmental Policy Act (NEPA) process, by wilderness law, and by concern over litigation, and as the Forest Service has minimized the recommended fuelbreaks to the point they are essentially illusory in an attempt to mollify wilderness advocates.

This testimony is not from the perspective of an academic, or a government agency, but rather from an individual who lives in a community that is primed to burn catastrophically, who has been trying to help solve the hazardous overgrowth problem on the ground in the real world, and who has seen the effect that poorly written and bad laws have had in hindering and blocking the ability of individuals and agencies to prepare for wildfires.

Below I present details on specific examples from my experience. I do that to illustrate by example what I expect are widespread problems throughout our nation, certainly in the western states, and because this is a case where the devil is in the details, and there is much devilry.

I intentionally use blunt candid language, because I believe part of the reason we continue to have this largely unaddressed problem of hazardous accumulations of wildfire fuels, which has been recognized at the federal level for at least 15 years, is happy talk and lack of candor.

EXAMPLES OF HOW BAD FEDERAL LAWS, AND BUREAUCRACIES, THREATEN LIVES, PROPERTY AND RESOURCES IN THE EVENT OF WILDFIRES, AND WHAT CAN BE DONE TO FIX THE PROBLEMS

1. How the Wilderness Act of 1964, and other wilderness acts, including The Big Sur Wilderness and Conservation Act of 2002, threaten lives, property and resources in the event of wildfire.

a. In 2008, the Basin Fire started in the Ventana Wilderness and was allowed to burn over the historic firebreak inside the perimeter of the Los Padres National Forest, threatening our community of hundreds of homes.

In June of 2008, the Basin Fire, one of the largest fires in California history, was started by lightning inside the Monterey Ranger District of the Los Padres National Forest.

Testimony of Michael Caplin on The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations" May 5, 2015

As the fire burned toward our rural community with hundreds of homes located in densely overgrown woodlands and brushlands, including hundreds-of-thousands of dead Tanoak trees killed by sudden oak death, I wondered why I did not see bulldozers working on the historic firebreak in the Los Padres National Forest as they had worked during the 1977 Marble Cone Fire and the 1999 Kirk Complex Fire, which had also been started by lightning inside the national forest and burned toward our community.

During a Basin Fire informational meeting I asked a Forest Service representative why that work was not taking place. He was evasive and did not answer the question. I asked again. He was evasive again.

Several days later the Basin Fire burned over the historic firebreak location, which remained unmaintained and overgrown in the section that had been used to help protect our community from past fires for decades.

The Basin Fire was now headed for our community. If it continued at its current pace it would likely have started burning homes in one or two days.

b. The Basin Fire was stopped from burning through our community after it burned onto private land in state jurisdiction.

Fortunately, there was one last topographically viable location to construct a firebreak, primarily on private land in state jurisdiction on Mescal Ridge, which in the past had been the location for a secondary/backup firebreak, but during the Basin Fire became the only topographically effective location for a firebreak between our community and the Basin Fire.

A massive air tanker under contract with the California Department of Forestry and Fire Protection (CAL FIRE), a modified DC-10 airliner, made multiple mile-long drops of fire retardant along a hastily bulldozed firebreak on Mescal Ridge, and fire crews backfired off the line, blocking the fire and saving our community of hundreds of homes from almost certain destruction and potentially from loss of life (there is only one narrow, dead-end, winding public road as an evacuation route, one lane wide in over a dozen places and only two lanes wide at best).

c. Why the Basin Fire was allowed to burn over the portion of the historic firebreak in the Los Padres National Forest that had been used for decades to stop wildfires that started in the national forest from burning through our community.

After the Basin Fire I sought to learn why the historic firebreak inside the national forest was not opened during the Basin Fire in the area where it had been used to protect our community in the past. I learned the following, which was not known to me before the fire.

i. 1968 USDA Report to President Johnson, provides background on fuelbreaks being intentionally left out of the Ventana Wilderness when it was created, due to severe wildfire hazard in the area.

In 1969, the U.S. Department of Agriculture established the 98,000 acre Ventana Wilderness in the Monterey Ranger District of the Los Padres National Forest, while intentionally leaving out ridges around its perimeter so fuelbreaks could be constructed with mechanized equipment due to hazardous wildfire conditions in the area.

In 1968, when the U.S. Department of Agriculture (USDA) proposed creation of the Ventana Wilderness, it prepared a report for President Johnson (USDA Report) that he forwarded to Congress.

I have included several highlighted pages from the 140 page USDA Report as Exhibit 2, which includes a hyperlink to download the entire document.

The USDA Report emphasized the wildfire hazard in the area and the need to *exclude* ridgelines around the proposed Ventana Wilderness area so peripheral fuelbreaks could be constructed and maintained with mechanized equipment, saying for example,

The proposed Wilderness contains dense and highly flammable brush in the lower elevation ranges. In addition, summer and fall temperatures are high, while humidity is low. Adequate fire protection would therefore be essential. [...] The boundary of this proposed Wilderness is very important and has been intentionally established wherever possible to allow the construction of peripheral fuelbreaks, and fire control access.

(See Exhibit 2, pg. 2.)

After discussing the need to be able to maintain fuelbreaks being the reason some areas would be left out of the proposed wilderness, the USDA Report concludes, "Therefore, all of the land having Wilderness qualities within logical Wilderness boundaries has been included in this proposal." (Exhibit 2, pg. 2, underline added.)

When established, the Ventana Wilderness encompassed about 98,000 acres.

The USDA Report also states,

The prime objective on the easterly boundary of this Wilderness proposal is to establish and maintain adequate continuous peripheral fuelbreaks on key ridges to protect the area from sweeping conflagrations. The boundary as proposed is on such a key ridge 20.5 miles in length. To include Areas F and G in this proposal would cancel this objective.

(See Exhibit 2, pgs. 4-5.)

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

I have included as Exhibit 3, page 1 a Google Earth screenshot showing the boundaries of the Ventana Wilderness when it was originally created.

ii. In 1978, Congress expanded the Ventana Wilderness over the location of the eastern peripheral fuelbreak.

In 1978, with the Endangered American Wilderness Act of 1978 (Wilderness Act of 1978), Congress expanded the Ventana Wilderness to the east, far over the location of the 20.5-mile-long ridgetop fuelbreak that had intentionally been left outside its eastern boundary, adding about 61,000 acres to the wilderness and canceling the USDA's objective of maintaining the eastern fuelbreak on the 20.5 mile-long ridge.

Given the statement in the USDA Report that "...all of the land having Wilderness qualities within logical Wilderness boundaries..." had been included in the original Ventana Wilderness area, this wilderness expansion was either illogical, or included land that did not have wilderness qualities, or both.

iii. In 1984 and 1992 Congress further expanded the Ventana Wilderness.

Other Congressional Ventana Wilderness expansions in 1984 and 1992, by The California Wilderness Act of 1984 (Wilderness Act of 1984) and the Los Padres Condor Range and River Protection Act (Wilderness Act of 1992) respectively, added more acres to the Ventana Wilderness.

With these additions the Ventana Wilderness was expanded to about 199,750 acres from its original 98,000 acres, creating yet more illogical or inappropriate wilderness. Exhibit 3, page 2 shows the Ventana Wilderness expansions from 1972 through 1992 in Google Earth.

In at least some locations, these wilderness expansions continued to leave some of the original fuelbreak locations out of wilderness.

iv. The 1972, 1984, and 1992 wilderness acts each include language to address the need to prepare for wildfires before they start, however, due to lack of clarity the language is not effective.

The Wilderness Act of 1972, Wilderness Act of 1984, and Wilderness Act of 1992 each include language intended to allow fuel reduction work in wilderness to prepare for wildfires before they start, which is also expressed in Congressional reports on these wilderness acts.

However, the language is not clear enough to avoid the threat of litigation should the Forest Service attempt to perform wildfire fuel reduction work in wilderness before a fire has started, and my understanding is the Forest Service has never performed such work in the Monterey Ranger District of the Los Padres National Forest. Moreover, the language does not clearly allow use of mechanized equipment to do the work.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

For example, the Wilderness Act of 1972 states,

In order to guarantee the continued viability of the Ventana watershed and to insure the continued health and safety of the communities serviced by such watershed, the management plan for the Ventana area to be prepared following designation as wilderness shall authorize the Forest Service to take whatever appropriate actions are necessary for fire prevention and watershed protection including, but not limited to, acceptable fire presuppression and fire suppression measures and techniques. Any special provisions contained in the management plan for the Ventana Wilderness area shall be incorporated in the planning for the Los Padres National Forest.

(92 Statutes 41; Public Law 95-237, section 2(d), 1978; emphasis added.)

Use of the undefined terms "appropriate" and "acceptable" introduce uncertainty about what is allowed, leaving the Forest Service concerned about litigation should it attempt to perform presuppression wildfire fuel reduction work in wilderness, and should it try to perform the work with mechanized equipment.

Similar lack of clarity is included in each of the cited wilderness acts and in House and Senate reports on them.

As recognized by the USDA Report, rather than include these areas within wilderness with unclear exceptions to wilderness prohibitions, instead, Congress should have acknowledged that it is not appropriate to include in wilderness: 1) areas that are topographically suitable for firebreaks or fuelbreaks; b) areas where mechanized equipment may be needed to address the problem of hazardous accumulations of wildfire fuels, and; c) areas for roads that may be used to access firebreaks and fuelbreaks, or may be used for evacuation, or may be used for ingress by emergency equipment during wildfires.

v. In 2001, the Forest Service started the National Environmental Policy Act process on 10 fuelbreak projects along the location of the historic fuelbreak, all of which were outside wilderness at that time.

In 2001, in response to the National Fire Plan and direction from Congress to address the problem of hazardous accumulations of wildfire fuels, the Forest Service proposed 10 fuelbreak projects along the location of the historic firebreak around the periphery of the Monterey Ranger District of the Los Padres National Forest.

Collectively, the Forest Service called the 10 fuelbreak projects the Monterey Defensible Fuel Profile Zone (MDFPZ). In 2001, all of the MDFPZ project areas were outside wilderness.

Attached to this testimony as Exhibit 4 is the Forest Service's 2001 National Environmental Policy Act (NEPA) scoping letter for the MDFPZ projects (2001 NEPA letter), which describes most of the MDFPZ fuelbreak projects as being up to 2,000 feet wide.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

One of the MDFPZ fuelbreak projects, called the Skinner project in the 2001 NEPA letter, would have helped protect our community of hundreds of homes from fires that start in the Monterey Ranger District of the Los Padres National Forest, which is where most major wildfires in Monterey County have started.

The Forest Service held MDFPZ NEPA scoping meetings, at least one of which was attended by the district director for Monterey County's Congressman, Sam Farr, and by members of a wilderness advocacy group, the Ventana Wilderness Alliance (VWA).

vi. In 2002, the Ventana Wilderness Alliance successfully lobbied Congress to move wilderness over 8 of the 10 MDFPZ project areas with the Big Sur Wilderness and Conservation Act of 2002.

Before the MDFPZ NEPA process was completed, VWA lobbied Congressman Farr and Senator Barbara Boxer to extend wilderness over 8 of the 10 MDFPZ project areas, including the Skinner project.

In 2002, the Big Sur Wilderness and Conservation Act of 2002 was enacted (2002 Wilderness Act). The bill, H.R. 4750, was passed out of the House without a hearing, in one minute in the middle of the night using unanimous consent, and was similarly passed out of the Senate five days later, and signed by the President about a month later. The bill's legislative history is attached as Exhibit 5. Exhibit 3, page 3 shows the 2002 Ventana Wilderness in Google Earth.

vii. The Forest Service abandoned 8 of the 10 Monterey Defensible Fuel Profile Zone projects after wilderness was extended over the project areas, and in at least one location wilderness was extended over the historic firebreak as well.

The wilderness additions in the 2002 Wilderness Act extended wilderness over the project areas of 8 of the 10 MDFPZ projects. As a result of the 2002 Wilderness Act, the Forest Service abandoned the 8 projects.

Attached as Exhibit 6 is an excerpt from the Forest Service's NEPA decision memo on the MDFPZ projects, which states, "After design of this project the *Big Sur Wilderness and Conservation Act* was passed in May of 2002 (H.R. 4750)" also stating that there was no wilderness added in the 2 remaining MDFPZ project areas.

The 2002 Wilderness Act successfully blocked 8 of 10 fuelbreak projects that would have helped protect lives and property in communities near the Los Padres National Forest, and moved wilderness up to the location of historic firebreaks and evacuation routes that were intentionally left out of the Ventana Wilderness when it was created.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

One of the abandoned MDPFZ projects was the Skinner project, where the 2002 Wilderness Act extended wilderness not only over the project area but over the location of the historic firebreak as well.

The 2001 NEPA scoping letter describes the Skinner project as being 700 acres, which over the five-mile distance from the top of Skinner Ridge to Post Summit would mean the fuelbreak would have had an average width of almost 1,200 feet.

The 2002 wilderness addition that blocked the Skinner project is called the Little Sur wilderness addition in the 2002 Wilderness Act.

I call the 2002 Wilderness Act wilderness additions "malevolent wilderness."

They were not merely illogical or inappropriate wilderness additions, but were intended to block life-protecting fuelbreak projects, and succeeded in doing so.

Who would do that?

To my mind the people who advocated for the 2002 Wilderness Act, knowing its purpose, are sociopaths who acted with callous and contemptuous disregard for the safety of people in communities around the Monterey Ranger District of the Los Padres National Forest.

I find it mind-boggling that any member of Congress would help them, and that Congress would let such outrageous legislation stand once informed about its nature.

viii. During the Basin Fire in 2008, hand crews started work in the 2002 Little Sur Wilderness Addition on a short section of the historic firebreak, where bulldozers had worked during past fires, and bulldozers turned away from the historic firebreak — the Basin Fire soon crossed over the largely untouched portion of historic firebreak (which was about 5-miles long), headed for our community.

In 2008, during the Basin Fire, hand crews started work on a short section of historic firebreak right in the Little Sur wilderness addition, in the same location where bulldozers had worked during past fires.

Before the hand crews had made much progress, the Basin Fire crossed over the historic firebreak right at the 2002 Little Sur wilderness addition, and the rest of the Skinner Ridge portion of the historic firebreak, about 5-miles long, which had not been worked on, was rendered meaningless and burned over (including areas where in the past bulldozers had worked to stop previous fires).

Attached as Exhibit 7 are several Basin Fire progress maps that show the Basin Fire crossing over the historic firebreak location through the Little Sur wilderness addition.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

On the Exhibit 7 maps, a bulldozer line is shown avoiding the Little Sur wilderness addition, turning aside and instead going to a topographically inferior location, which the Basin Fire soon burned over. North of that location, a bulldozer line is also shown avoiding the segment of the historic firebreak that had been worked on with bulldozers during past fires. As a result, a section of the historic firebreak about 5-miles long was not opened during the Basin Fire and the fire was allowed to burn over it, heading for our community.

Exhibit 12 compares the burn area of the Marble Cone Fire in 1977 with the burn area of the Basin Fire in 2008, and shows the unused portion of the historic firebreak.

d. Wilderness designation threatens lives and property by acting to block wildfire fuel reduction projects before wildfires and by delaying use of mechanized equipment, especially heavy equipment, during wildfires.

As discussed in 1.b. above, but for quick action by CAL FIRE on state jurisdiction land, our community would likely have been burned out in 2008 by the Basin Fire due to the 2002 Little Sur wilderness addition combined with Wilderness Act of 1964 prohibitions on use of mechanized equipment and Forest Service policy on approval for use of heavy equipment in wilderness during wildfires.

Even during wildfires, use of heavy equipment is prohibited in wilderness without authorization through the chain of command (Forest Service Manual (FSM) sections 2326.04c and 2326.1.1). Though heavy equipment was in the area, authorization to use heavy equipment in wilderness was apparently either not requested or was not authorized in time for use of the 5-mile-long Skinner Ridge to Post Summit segment of the historic firebreak, which runs through the 2002 Little Sur wilderness addition.

It appears that the Forest Service now waits until fires are closer to the location of historic firebreaks, than in the past, before it authorizes use of mechanized equipment in wilderness.

In addition to the 2002 Little Sur Wilderness Addition, other 2002 Wilderness Act malevolent wilderness additions also caused delays on use of heavy equipment on the historic peripheral firebreak in other areas.

Last week I had the opportunity to ask one of the bulldozer operators who worked on Basin Fire firebreaks if he experienced delays getting authorization to work in wilderness. His answer was, "Yes." I asked him how long the delay was, his answer was, "Three days." I have been told similar by other bulldozer operators who worked on Basin Fire firebreaks.

e. Wilderness continues to threaten lives, property and resources in Monterey County by blocking implementation of recommendations in the Monterey County Community Wildfire Protection Plan.

After the Basin Fire, the Monterey County Community Wildfire Protection Plan was written (CWPP). The CWPP may be downloaded from www.firesafemonterey.org/mccwpp.html.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

As a result of Forest Service delays during the Basin Fire authorizing opening of historic firebreaks in wilderness with heavy equipment, the CWPP includes the recommendation that within three years after execution of the CWPP the historic peripheral fuelbreak in the Monterey Ranger District of the Los Padres National Forest be maintained to be an effective fuelbreak, capable of stopping the spread of fire under adverse conditions, as described in the CWPP. This recommendation applies both inside and outside wilderness. (CWPP section 9.1, pages 72-75.)

The three-year timeframe for completion of the fuelbreak was proposed by the U.S. Forest Service during writing of the CWPP, changed from one-year in an early CWPP draft at the request of the Forest Service.

The pre-fire fuelbreak preparation is recommended in the CWPP to avoid the need to rely on the Forest Service to act to authorize opening of firebreaks during wildfires, and is consistent with language in wilderness acts that added wilderness in the Monterey Ranger District, and with Congressional intent expressed in House and Senate committee reports on those wilderness additions (the CWPP reviews these authorities at its pages 21-24).

The CWPP was signed by essentially all fire agencies in Monterey County, including the U.S. Forest Service, the Bureau of Land Management, and military fire departments.

The Forest Service has since expressed concern that the language in wilderness acts adding wilderness to the Ventana Wilderness, which was intended to allow pre-wildfire/pre-suppression fuel reduction work in wilderness, is not clear enough to avoid litigation if it creates and maintains the fuelbreak in wilderness.

Moreover, the Forest Service alleges that the Wilderness Act of 1964 requires it to perform a wilderness "minimum impact analysis," which it says precludes work in wilderness where comparable work can be done outside wilderness, regardless of the language in subsequent wilderness acts and Congressional reports intended to allow such work in wilderness before fires start.

In an attempt to gain agreement from wilderness advocates to work on the fuelbreak in wilderness with motorized equipment, the Forest Service initiated a process it calls FireScape Monterey. One of the three team leaders of FireScape Monterey is one of the same VWA wilderness advocates who supported the 2002 Wilderness Act's malevolent wilderness additions.

FireScape Monterey meetings were "facilitated" by the Nature Conservancy. Ground rules included that the past could not be discussed, including no mention of events during the Basin Fire resulting from wilderness being moved over MDFPZ fuelbreak project areas and over the historic firebreak.

Out of FireScape Monterey came a Forest Service proposal for a fuelbreak project along portions of the historic firebreak, which the Forest Service calls the Strategic Community Fuelbreak Improvement Project (2012 Fuelbreak Project).

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

It has now been over four years since execution of the CWPP in December of 2010, and no work on the ground has been completed on the 2012 Fuelbreak Project.

Forest Service officials say the 2012 Fuelbreak Project NEPA process is still well over a year from completion and that NEPA is being painstakingly complied with in anticipation of litigation over use of mechanized equipment, e.g., chainsaws, to construct the fuelbreak in wilderness.

f. The Forest Service's 2012 Fuelbreak Project appears to be designed to minimize the fuelbreak to mollify wilderness advocates and deflect CWPP recommendations rather than to implement CWPP recommendations for fuelbreaks capable of stopping the spread of fire.

Exhibit 8 to this testimony is the Forest Service's NEPA scoping letter and map for its 2012 Fuelbreak Project (2012 NEPA letter).

In some of the same locations where the 2001 MDFPZ projects proposed up to 2,000 foot wide fuelbreaks, the 2012 Fuelbreak Project proposes fuelbreaks up to 150 feet wide, and in several locations up to a maximum of 300 feet wide.

In the Skinner Ridge area the 2012 Fuelbreak Project proposes a fuelbreak a maximum of 150 feet wide, with no minimum width, where the 2001 Fuelbreak Project planned a width of almost 1,200 feet.

The narrow width of the proposed 2012 Fuelbreak Project necessitates that the Forest Service take action during a wildfire to stop the spread of fire, which defeats the purpose of the fuelbreak recommendations in the CWPP, which describes fuelbreaks as being maintained to be effective to stop the spread of fire, without requiring further action by the Forest Service during a fire. The Forest Service demonstrated during the Basin Fire it is capable of not taking timely action during a fire.

To explain the narrow width of the proposed 2012 Fuelbreak Project, a Forest Service representative recently told me there is a study that says that a fuelbreak cannot stop the spread of fire, and that the need for Forest Service action during a fire, such as backfiring off a fuelbreak, is not avoidable, implying any additional width would be a waste of effort.

However, during the collaborative meetings while drafting the CWPP, there was much discussion on that subject, including with Forest Service participation, and a CAL FIRE forester with decades of experience informed those working on the CWPP that a properly designed and maintained fuelbreak can stop the spread of fire without further action, and that he had personally seen that work.

Based upon the CAL FIRE forester's experience that a fuelbreak can be designed and maintained to stop the spread of fire without further action, draft CWPP language was changed from recommending that the *firebreak* be maintained at all times, to recommending that the

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

fuelbreak be maintained at all times. This change was made at the request of a VWA representative who objected to maintaining a firebreak. The CWPP discusses the difference between a firebreak and a fuelbreak in Notes 1 and 2 on page 74.

In addition to the narrow width, the Forest Service's proposed 2012 Fuelbreak Project entirely omits a 7-mile portion of the historic firebreak location on the northern end of the Monterey Ranger District, which in the past was the location of the firebreak used to protect Carmel Valley and other at-risk communities from wildfires that start in the Monterey Ranger District of the Los Padres National Forest (see project map at Exhibit 8, page 6). The omitted portion was the location of the peripheral firebreak used to stop the 1977 Marble Cone Fire and the 2008 Basin Fire, and was opened during the 1999 Kirk Fire though the Kirk was stopped before it reached it.

A Forest Service official has explained that the 7-mile omission is due to the Forest Service's wilderness "minimum impact analysis," which he said requires that work not be done in wilderness if there is a location outside wilderness where comparable work can be done.

The Forest Service points to a firebreak to the north of the historic peripheral fuelbreak, outside the Monterey Ranger District, on private land in state jurisdiction, which was constructed as a backup firebreak by CAL FIRE to help protect Carmel Valley and other at-risk communities during the Basin Fire, saying that because the state backup firebreak is comparable to the firebreak in the Los Padres National Forest, the minimum impact analysis forbids working on a fuelbreak along the historic firebreak inside the national forest's Ventana Wilderness.

However, maintaining a single fuelbreak outside the national forest is not comparable to maintaining two fuelbreaks, one inside the national forest and another fuelbreak miles to the north outside the national forest. Relying on a single fuelbreak outside the national forest would move the fuelbreak between 2 to 5 miles closer to at-risk communities, and would leave communities with only a single fuelbreak, in state jurisdiction, between them and wildfires that start inside the national forest, where Monterey County's largest wildfires have started.

Exhibit 9 shows the 2012 Fuelbreak Project map in Google Earth, with the omitted portion of the fuelbreak marked, and with Basin Fire firebreaks shown, including the firebreak to the north that the Forest Service says justifies not including the northern portion of the historic fuelbreak in the 2012 Fuelbreak Project.

g. The Monterey County Community Wildfire Protection Plan recommends that Congress enact legislation to enable and require the Forest Service to install, maintain and defend the fuelbreaks recommended in the CWPP.

The CWPP recommends that if the fuelbreaks recommended to the Secretary of Agriculture in the CWPP have not been "installed, maintained and defended within three years" from the date the CWPP is signed, then Congress is asked to enact legislation to enable and require the Forest Service to install, maintain and defend the fuelbreaks to be effective as described in the

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

CWPP at recommendation sections 9.1.1. and 9.1.2. (Recommendation to Congress at CWPP section 9.3, pages 81-82.)

The CWPP was signed by all required signatories on December 14, 2010.

We are well over 3 years, now almost 4 ½ years after the CWPP was signed, and the Forest Service says it could be well over a year before the NEPA process is completed, and it expects litigation over working in wilderness, which would cause further delays.

It would be outstanding if the Committee on Energy & Natural Resources could help with legislation to end the delays installing the fuelbreaks and ensure that all fuelbreak segments are completed and maintained without potential for litigation.

Each fire season without the fuelbreaks in place is like a game of wildfire Russian Roulette for communities around the national forest in Monterey County.

h. All federal lands suitable for fuelbreaks, firebreaks, access roads to them, and roads for ingress and egress during wildfires should be removed from wilderness with generous setbacks of wilderness.

All federally owned land should be removed from wilderness if it is topographically suitable for firebreaks and fuelbreaks, along with all areas needed for roads to readily access firebreaks and fuelbreaks, and all areas alongside roads that could be used for ingress and egress during wildfires, all with generous setbacks of wilderness.

As essentially stated by the USDA Report, it is illogical to do otherwise. Moreover, it is not possible to ferret out all of the places in the nation where wilderness was malevolently moved over firebreaks and fuelbreaks.

If it is not possible, or somehow not desirable, for federal land that is topographically suitable for firebreaks and fuelbreaks to have effective firebreaks and fuelbreaks constructed and maintained on it, then the federal land should be sold or granted into private ownership to make such construction and maintenance possible.

For Congress to leave laws and regulations in place that hinder or block construction and use of effective fuelbreaks and firebreaks on federal, state or private land, is the same as Congress threatening surrounding communities in the event of wildfire, especially in the western states where wildfires are increasingly prevalent.

As discussed below, lack of effective firebreaks and fuelbreaks on federal land also acts to aid and abet terrorists who may chose to exploit the multiple threats to our national security that such conditions promote.

The day may come when we are prepared to the point we can let wildfires burn through communities, but that day has not yet come and will not come without comprehensive changes to

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

federal, state and local laws to allow and facilitate reduction of hazardous accumulations of wildfires to safer more natural levels.

2. How failure to effectively prepare for wildfires on federal lands acts to increase multiple threats to our national security should terrorists choose to exploit them.

a. First terrorist threat increased by failure to effectively prepare federal lands for wildfires.

May 31, 2012 the Department of Homeland Security (DHS) issued a document titled "Terrorist Interest in Using Fire as a Weapon."

The document includes information on terrorist magazines and websites on such topics as how to construct incendiary devices to start wildfires, a terrorist map that shows priority states where wildfires in the United States would be most destructive, naming California and Montana as ideal targets, and statements encouraging the setting of wildfires to attack the United States.

The DHS document explains that using wildfire as a weapon is attractive to terrorists due to the low cost to start a wildfire, the low probability the terrorist will be caught, the high cost and damage to property and resources that can be caused, and the threat to lives and psychological effects wildfire can inflict, saying for example,

For terrorists, setting fires has several advantages over other methods of attack, including sustainability (duration of fire and long-term effects); the potential for casualties, economic damage, and wide media coverage; and the accompanying psychological effects of fear and terror.

When the Forest Service or other federal agency fails to maintain effective fuelbreaks and firebreaks on federal lands that are topographically suited for such use, given that it is readily foreseeable that terrorists may use wildfire as described in the DHS document, the Forest Service is literally aiding and abetting any terrorist who may act to use wildfire as a weapon against our nation.

When Congress acts to hinder or block federal agencies such as the Forest Service from preparing for or defending against wildfires, by such actions as moving wilderness near or over land suitable for fuelbreaks and firebreaks, or by leaving wilderness in place in such areas, or by enacting or retaining other laws that hinder or block federal land managers from constructing and maintaining fuelbreaks or using firebreaks, given that it is readily foreseeable that terrorists may use wildfire as described in the DHS document, Congress is literally aiding and abetting any terrorist who may act to use wildfire as a weapon against our nation.

This is especially so in western states, where the federal government owns vast amount of land and where wildfires are prevalent. See Exhibit 10, which is a map that shows federal land ownership in the United States, and Exhibit 1, which shows the priorities for need of vegetation management in the United States, by county.

Testimony of Michael Caplin on The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations" May 5, 2015

In Monterey County, California, both the Forest Service and Congress have so acted, leaving people in communities around the Los Padres National Forest in jeopardy should terrorists decide to use wildfire to attack, as advocated in their magazines and on their websites.

b. Second terrorist threat increased by failure to effectively prepare federal lands for wildfires.

There is a belief among some environmentalists that the solution to impacts humans have on our planet is to concentrate people into the footprint of existing cities at ever higher density. Search the Internet for the term "smart growth" and you will receive well over one millions hits. Until recently, the Sierra Club had a "Healthy Growth Calculator" web page that apparently tried to convince people that living at higher density is desirable. (<http://tinyurl.com/lox4fc2>)

Though some government employees may be able to live on land owned by the federal government, other people typically cannot. One way to move people into cities is to convert private land outside cities into government ownership. There are organizations working on that, some of which have turned it into a profitable business.

I discuss in detail the issue of government acquisition of private land, including acquisitions by federal agencies, in my testimony on the Committee's hearing on "*Reauthorization Of and Potential Reforms To the Land and Water Conservation Fund*," April 22, 2015

To the extent that wildfires in rural areas motivate people to choose to live in cities at higher density, rather than live in rural areas at lower density, wildfires contribute to further concentrating our populations into smaller land area at higher densities.

California's population of about 38.8 million people makes up about 12% of the 318.9 million population of our nation.

California consists of about 100 million acres of land. Currently, about 95% of Californians live in cities, which comprise about 6% of California's land area. This is largely because there is relatively little land available outside cities for Californians to own and live on.

Almost half of California is owned by various government agencies, most by federal agencies, and therefore cannot be owned or lived on by most Californians.

It is difficult to find hard numbers for land ownership in California by industry, but years ago I found what numbers I could and learned that after subtracting land owned by government, public utilities, lumber companies, railroads, and farmland, it appears that only about 10% of California's land area, outside of cities, is available for Californians to own and live on.

Unfortunately, we live in a world with religious extremists who believe it is an act of their faith to kill those who are not members of their faith. Our world also includes weapons of mass destruction. These extremists have been following their belief system for over 1,000 years.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

They are not going away. They have made their intent crystal clear. 1,000 years ago the world did not have weapons with the capacity for destruction we have today. The day will likely come, possibly sooner, hopefully later, when they will obtain weapons of mass destruction.

Mutually assured destruction, the defense tactic used for decades with the former Soviet Union, is not applicable to religious extremists. We don't know where to find them, and even if we could find them, they view it as an act of their faith to be killed while advancing their cause, which is to kill those who do not follow their faith. When they obtain weapons of mass destruction they will likely use them.

Weapons of mass destruction are highly effective at killing people who are packed at high density into relatively small areas.

Without the defense of mutually assured destruction, short of intercepting 100% of weapons of mass destruction before they enter our country, the best national defense tactic to defeat weapons of mass destruction is to disperse our populations over large areas at relatively low density. High density cities with large populations are equivalent to prime target zones for weapons of mass destruction.

The federal government should be selling or granting land into private ownership in California and other western states, where it owns vast areas, making it available for people to disperse onto. It will take much time to disperse our populations and set up infrastructure to support an economic system that works efficiently with dispersed populations, such as high speed Internet in low density areas. It is not prudent to wait until it is too late.

Failure to maintain federal lands with effective fuelbreaks, firebreaks, evacuation and emergency access routes that are safe to use during wildfire, and fuel levels that approximate the levels they would be had fires been burning at their natural return interval, is counterproductive to our nation's defense against weapons of mass destruction in the hands of religious extremists, and ultimately will aid them should the time come when they attack our nation with weapons of mass destruction, which is readily foreseeable over time.

I believe there are people, radical environmentalists, who would not be bothered if the number of humans was reduced dramatically by such cataclysmic events as use of weapons of mass destruction on densely populated areas. My take is that those people could easily be the vanguard of the next great evil on our planet. They should not be helped, certainly not by our government.

3. How the Clean Water Act and Rivers and Harbors Act may act to threaten lives, property and resources in the event of wildfires.

I am not certain that the Clean Water Act and Rivers and Harbors Act apply to wildfire fuel reduction projects in or near creeks or rivers, but have included them in this testimony in case they do. Here is why.

Testimony of Michael Caplin on The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations" May 5, 2015

In 2014, California's Governor Jerry Brown issued declarations of drought emergency in which he directed state agencies to help mitigate against conditions that could result from drought. As a result, the California Public Utilities Commission adopted a resolution directing regulated electric power utilities in California to make grants to reduce hazardous accumulations of wildfire fuels.

In August of 2014 I received a notice from Pacific Gas & Electric Company (PG&E) announcing it was asking for grant applications for wildfire fuel reduction projects.

A condition of the PG&E grants was that the projects had to be completed by October 31, 2014, which was expected to be the end of California's wildfire season that year.

I applied for a PG&E grant to do work along a road in our community that would serve as an evacuation route during a wildfire, to help make it safer to use in the event of wildfire and improve the road as a fuelbreak. On September 19, 2014 PG&E sent notice that the grant would be awarded. There was little time left to complete the project.

A potential problem was that in some locations the road is close to a creek that is piled with dead and down Tanoak trees killed by sudden oak death. Looking on the Internet for information on regulations for working near and in streams, I found a paper written by the California Association of Resource Conservation Districts, found here <http://www.carcd.org/docs/publications/guidetowatershedpermitting.pdf>.

The paper states, "If you are planning work in surface waters such as rivers, streams, lakes, wetlands, any impoundments of these waters, or the territorial seas, a [U.S. Army Corps of Engineers] permit may be required."

There was no time to involve the Army Corps of Engineers, and it was likely that the California Department of Fish and Wildlife would also need to be involved if work was done near the creek, so the decision was made to simply avoid the creek and not work where the creek would be affected.

I have attached as Exhibit 11, a photograph showing a sample of the condition the creek was left in, with dead tree fall that could have been removed as part of the grant project. The large standing tree trunks in the photo are Redwoods, for which the dead and down trees in the creek would effectively be kindling in the event of wildfire.

Another example of the problem of overregulation of fuel reduction work in and near streams is described in a report prepared for the Governors of California and Nevada after the 2007 Angora Fire in the Lake Tahoe area, the "Emergency California-Nevada Tahoe Basin Fire Commission Report" (Tahoe Commission Report).

The purpose of the Tahoe Commission Report was to learn why the Angora Fire had been so destructive, burning thousands of acres and destroying 254 homes, so action could be taken to reduce losses to wildfires in the future.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

The Tahoe Basin Fire Commission was co-chaired by then California State Fire Marshal Kate Dargan. The Tahoe Commission Report can be downloaded at <https://goo.gl/U3WIHz>.

The Tahoe Commission Report describes problems caused by over-regulation of fuel reduction projects, especially in "stream environment zones," areas near streams, saying for example,

SEZs [Stream Environment Zones] in the Lake Tahoe Basin pose both extreme fire risks and extraordinary environmental challenges. In times of fire, such as both the November 2002 Pioneer Fire and the Angora Fire, the fires quickly changed from surface fires to crown fires because untreated SEZs allowed fire to quickly move through overstocked and insect diseased forested areas. Commentators have referred to the SEZs in these areas as operating like "candle wicks" during times of fire, advancing the severity of crown fires.

(Tahoe Commission Report, page 58.)

The Tahoe Commission Report includes numerous photographs of untreated areas in stream environment zones. For example at pages 30, 56, 57, 77, 123, 147, and 158.

The Tahoe Commission Report is not clear about specifically which laws caused which problems, but indicates that layers of federal, state, and regional laws hindered fuel reduction work, including the Clean Water Act, saying in one of its findings,

The existing system to permit fuel reduction projects in the Lake Tahoe Basin is often confusing, sometimes redundant, and overly complex. [¶]...[¶] Fuel reduction projects that are proposed or funded by public agencies, or that require federal, state, local, or local discretionary approval, are subject to numerous federal, state, and/or regional environmental laws and regulations.... These include the National Environmental Policy Act, California Environmental Quality Act, Clean Water Act, Clean Air Act, Endangered Species Act, and the Forest Practices Act. In addition to federal and state laws, the Tahoe Regional Planning Agency (TRPA) has a comprehensive Code of Ordinances that affects all agencies, organizations, and individuals in the Basin.

(Tahoe Commission Report, page 32.)

Some of the listed laws are federal, some state, and some regional. Where we are, in California's coastal zone, California's Local Coastal Program replaces the TRPA ordinances, causing additional problems.

Even if the Clean Water Act does not apply to wildfire fuel reduction projects in or near streams, Congress should amend the Clean Water Act to clearly say that it does not apply to fuel reduction work, so people will know they need not leave hazardous accumulations of wildfire fuels in streams to avoid potential penalties.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

4. How the Migratory Bird Treaty Act acts to threaten lives, property and resources in the event of wildfires.

A paper on the U.S. Fish & Wildlife Service's website, written to advise people in San Diego County, California, how to comply with various laws while trying to reduce hazardous accumulations of wildfire fuels, summarizes the Migratory Bird Treaty Act (MBTA) and how to comply with it as follows,

Migratory Bird Treaty Act

- Was enacted to put an end to the commercial trade of birds and their feathers.
- Prohibits killing, possessing, or trading migratory birds.
- Applies to whole birds, parts of birds, bird nests and eggs.
- Applies to many common bird species and private, state and federal lands.
- Does not provide protection of habitat of migratory birds, but does prohibit the destruction of active bird nests in active use without a permit from U.S. Fish and Wildlife Service.
- It is easiest to avoid active nests by working during the non-breeding season.
- This means avoiding vegetation removal between March 1 and August 31.
- If you want to work during the nesting season, you should hire a biologist to survey for nesting birds and mark sites to be avoided during vegetation removal.
- Leave a buffer of vegetation around each nest to avoid nest abandonment.

(www.fws.gov/cno/docs/fire/SanDiegoHandout.pdf, page 7, underline added.)

The paper notes that there are over 800 species on the list of birds protected by the MBTA. Some are rare, but many game birds are protected as they nest so there will be an abundance to be shot at later by hunters.

The MBTA was inspired by the slaughter of millions if not billions of passenger pigeons in the late 1800s and early 1900s, which included attacks on their nesting sites.
(<http://www.audubon.org/magazine/may-june-2014/why-passenger-pigeon-went-extinct>)

As noted in the San Diego County paper, the easiest way to comply with the MBTA is by not performing wildfire fuel reduction projects between March 1 and August 31.

That reduces the time during the year to perform wildfire fuel reduction projects by half, from 12 months to 6 months.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

Because loss of summer months to the MBTA may be in addition to loss of winter months due to concern about ground disturbance and erosion caused by winter rains, the time of the year during which wildfire fuel reduction work can be performed may be reduced substantially.

The alternative is the cost of hiring a biologist to survey and mark the area, which would be on top of other costs related to the work.

To the extent the MBTA contributes to hindering or blocking wildfire fuel reduction projects by limiting the time of year they can be performed or by adding to costs, leading to loss of nesting sites to high heat intensity wildfires fueled by unaddressed unnatural accumulations of wildfire fuels, applying the MBTA to wildfire fuel reduction projects is counter productive to the purposes of the MBTA.

The MBTA was enacted in 1918, not long after the U.S. Forest Service was formed in 1905. The problem we have today, caused by over 100 years of the policy of working to suppress all wildfires starting after the big burn in 1910, did not exist at the time of enactment.

Congress should amend the MBTA to clearly exempt wildfire fuel reduction projects from its application.

5. How the Endangered Species Act acts to threaten lives, property and resources in the event of wildfires.

In general terms, the Endangered Species Act (ESA) prohibits any person from taking any listed threatened or endangered species unless they first obtain an incidental take authorization from the appropriate federal agency. The ESA, federal ESA enforcement agencies, and courts interpret the meaning of "take" exceeding broadly, to include even an unknowing take.

Strict application of the ESA as interpreted by agencies and courts would be paralytic to all fuel reduction projects in any area where a protected species may be located, if, the project is considered to be harmful to a protected species, unless a costly and time consuming consultation process is undertaken to obtain authorization for an incidental take.

The question is, in the context of wildfire fuel reduction work, which may well be beneficial to the welfare of a species in the big picture by reducing wildfire fuels in an area to the point it helps protect the species from harm by unnatural high heat intensity wildfire, but might be detrimental to a particular member of the species due to an incidental take while performing the work, does the work cause "harm" to the species, or is it beneficial to the species?

I am not an expert on the ESA and do not know if courts have addressed this issue. The closest opinion I find is *Babbitt v. Sweet Home Chapter, Communities for Great Ore.* (1995) 515 US 687 (*Babbitt*), which finds that the word "harm," included in the definition of a "take," which is prohibited without authorization, includes habitat modification that indirectly causes harm.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

However, *Babbitt* does not consider the case when habitat modification ultimately benefits the species though it may harm some individuals of the species in the short term.

I believe most people understand that the greater good is protection of the species by performing the work, and that to the extent that the ESA hinders or blocks fuel reduction projects to the point less work is performed due to added costs, delays or prohibitions, then the result will be contrary to the intent of the ESA of advancing the welfare of listed species.

An example is the following news report that was on a San Francisco radio station, KGO (8-11-2014, 8:19 am).

REPORTER 1: A tree thinning project intended to decrease the wildfire danger around Lake Tahoe has been put on hold. The Tahoe Daily Tribune reporting that land near Upper Echo Lake is being considered as a critical habitat for an endangered species of frog. Now a lawsuit's been filed raising concerns about the effects the project might have on the Sierra Nevada Yellow Legged Frog.

REPORTER 2: Well, if there's a wildfire that would hurt the frogs too, right?

REPORTER 1: It kinda would. Yeah.

Moreover, at least one court has held that when there is a question of both harm to threatened species and harm to humans, the ESA does not place preventing harm to the species over preventing harm to humans, saying,

This case involves both harm to threatened species and to humans and their environment. Congress has not nor does *TVA v. Hill* elevate species protection over the health and safety of humans.

(*Consolidated Delta Smelt Cases* (2010) 717 F.Supp.2d 1021, 1068-69.)

The Tahoe Commission Report repeatedly discusses that over-regulation of wildfire fuel reduction work contributed to the destructive effects of the Angora Fire, and repeatedly recommends that the priority needs to be protection of life, property, and the environment, in that order, saying for example,

With respect to all matters within the Tahoe Basin, the Commission determined that protection of life, property, and the environment be served in that order of priority.

(Tahoe Commission Report, page 10.)

Revisions of policies shall be focused on facilitating implementation of these [wildfire fuel reduction] projects, with the priority given to protection of life, property, and the environment, in that order.

(Tahoe Commission Report, page 79.)

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

The Governors of California and Nevada should adopt the priorities of life, property, and the environment, in that order, with respect to fire safety, fire prevention, and related matters within the Lake Tahoe Basin.

(Tahoe Commission Report, page 104.)

The Commission recommends that all permitting agencies within the Tahoe Basin, all entities providing funding for fuel treatment projects within the Basin, and all land managers within the Tahoe Basin should assign, as their respective first priority for action, fuel treatment projects most likely to protect life, property, and the environment in that order. To the extent this may require regulatory procedures to be expedited, they should be to the maximum extent possible.

(Tahoe Commission Report, page 110.)

Congress should amend the ESA and all other laws that may hinder or block performance of wildfire fuel reduction work to be crystal clear that in the context of wildfire fuel reduction work the priority is protection of human life, protection of property and protection of the environment, in that order, and that long term welfare to protected species has priority over short term harm to protected species, and that no permit or consultation shall be required for performance of fuel reduction work so long as any take is not intentional, and that an intentional take is allowed if it is necessary to protect human life or property, or for the long term benefit of the species.

Without such comprehensive changes to law, hindrances and roadblocks will continue to slow the progress of this important work, and we will continue to fall behind as the problem grows worse, to the detriment of humans and other species alike, including protected species.

It is wrong that people who want to do the right thing by helping prepare for wildfires by reducing hazardous accumulations of wildfire fuels to safer more natural levels have to go through a costly and time consuming incidental take process or have to look over their shoulder and worry that they will be fined should a regulatory agency say that they modified a habitat and that resulted in harm to a listed species.

6. How the Equal Access to Justice Act acts to threaten lives, property and resources in the event of wildfires.

The Equal Access to Justice Act (EAJA) is one of the laws expressly recommended to be changed to facilitate preparation for wildfires by the "National Comprehensive Wildland Fire Management Strategy: Phase III, Western Regional Science-Based Risk Analysis Report." (See pages 1 and 2 in this testimony.)

Generally, the EAJA incentivizes lawsuits based upon the various laws that act to hinder or block wildfire fuel reduction work by providing for an award of attorney's fees and recoverable expenses to a party who prevails in litigation. (28 U.S.C. § 2412(d)(1)(A).)

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations* May 5, 2015

An article in the Journal of Forestry shows the increasing amount of EAJA awards over time in lawsuits against the Forest Service, and also discusses that the original intent of the EAJA was to,

- (1) make the federal justice system more accessible to parties defending themselves against what Congress perceived as unreasonable government action,
- (2) provide an incentive for citizens to contest excessive government regulation,
- (3) supply additional compensation for citizens who were injured by government actions, and (4) deter overreaching regulation by federal agencies....

(Journal of Forestry, September 2011, pages 352-358, <http://goo.gl/iUVzrj>.)

To the extent that the paper is correct on the intent of Congress, and to the extent that the EAJA is used by activists to help pay the cost of litigation to force federal agencies to increase regulations, the EAJA has been turned into a tool that is opposite to the intent of Congress when it enacted the EAJA.

To the extent that the EAJA is used by activists to help pay the cost of litigation to hinder or block performance of wildfire fuel reduction projects by federal agencies, or to hinder or block authorizations or approvals by federal agencies that allow others to perform fuel reduction projects, then the EAJA has been turned into a life threatening law.

Congress should amend the EAJA to not apply to any wildfire fuel reduction projects by federal agencies, or to any approvals by federal agencies related to wildfire fuel reduction projects.

Conclusion

The deadline for submittal of this testimony approaches. Much more could and should be written but cannot be written here.

I expect many more laws, not touched on in this testimony, also act to hinder or block wildfire fuel reduction work, and should also be amended if we are to have any hope of solving the growing problem of continuing accumulation of wildfire fuels.

I ask the Committee to keep in mind in the event you work on changes to federal law, that federal laws that are not directly applicable to individuals may be picked up by state and local government and applied to individuals through state and local laws, which could hinder or block this important work. Clear statements in statutes that the intent of Congress is that federal laws are not to be applied in ways that may act to hinder or block wildfire fuel reduction work will help to avoid roadblocks to wildfire fuel reduction work by state and local laws.

For years, Congress has made grant funds available to help pay for the cost of environmental compliance and performance of wildfire fuel reduction work.

Testimony of Michael Caplin on *The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations*" May 5, 2015

However, there is not enough grant money to fund even a small fraction of the work that is needed on private land. It is time for government, federal, state and local, to step aside and allow landowners to care for their land without regulatory costs, delays or other government induced hindrances or roadblocks.

Many state and local laws will also need to be changed. The federal government has long recognized this problem, and Congress should lead the way by demonstrating how laws can be comprehensively amended to allow and facilitate this important work.

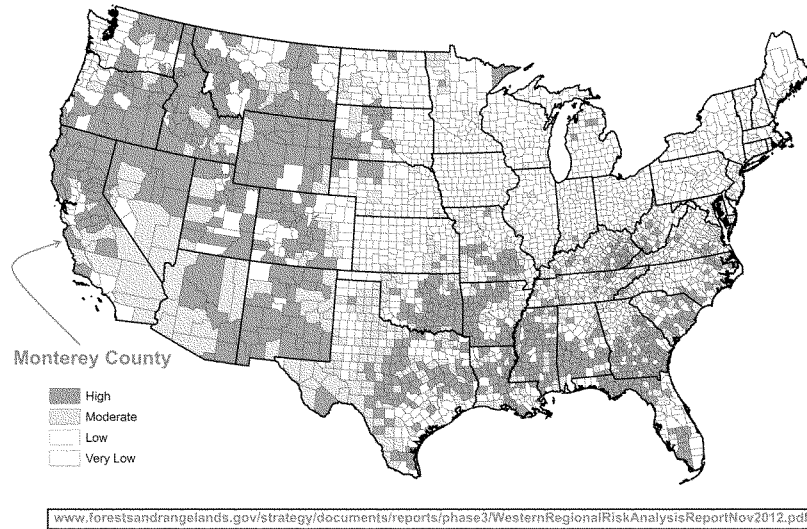
I also ask the committee to consider, in the context of this testimony, my May 6, 2015 testimony on the Committee's hearing on *Reauthorization Of and Potential Reforms To the Land and Water Conservation Fund*, April 22, 2015, especially its discussion of the appearance of a conflict of interest between federal land management agencies in their role as fire fighting organizations, and their role acquiring private land.

I pray the Committee, and ultimately Congress, will agree on the need for *The Comprehensive Wildfire Preparation Facilitation Act of 2015*, and will write it to unambiguously allow and facilitate this much needed work.

Respectfully Submitted,



Michael Caplin
38751 Palo Colorado Rd.
Carmel, CA 93923



Vegetation and Fuels

National prioritization of areas for broad-scale fuels management (as distinct from hazard reduction in proximity to structures) suggests a primary emphasis in the West and Southeast. These included counties with the highest level of wildfire, fire-adapted native vegetation, and communities concentrated within a broader wildland landscape. Each location would utilize the mix of options most suitable for local conditions, as described in Options 1-4.

EXHIBIT 2, PG. 1

[Excerpt. Highlight added.]

[Full document can be downloaded at <https://bulk.resource.org/gao.gov/88-577/00004BA1.pdf>]

PROPOSING NEW WILDERNESS AREAS

COMMUNICATION

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

LETTERS AND REPORTS FROM THE SECRETARY OF
AGRICULTURE AND THE SECRETARY OF THE INTERIOR
PROPOSING NEW WILDERNESS AREAS, AND SUPPORTING
THE RECOMMENDATIONS THEREIN

THE VENTANA WILDERNESS IN CALIFORNIA

FILE COPY
Legislative Digest Section
Room 7016 Ext. 4633
PL 88-577



APRIL 1, 1968.—Referred to the Committee on Interior and Insular Affairs
and ordered to be printed with illustrations

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1968

92-181 O

3511

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

MANAGEMENT CONSIDERATIONS

EXHIBIT 2, PG. 2

STRUCTURES AND ACTIVITIES

To provide for recreational use there are many widely dispersed campsites within the area. Developments consist of closed fireboxes or stoves, a slight departure from naturalness but a necessary fire precaution, and rustic-type sanitation facilities. There are no garbage pits. Users would be required to carry out unburnable refuse.

Trails for foot and horse traffic would be maintained to disperse use within the area and to protect it from erosion. Helicopter landing spots to augment fire control have been hand cleared and others would be developed as needed to permit the landing of men and equipment for fire suppression. The Ventana Lookout, serviced only by pack stock, would be continued for fire detection.

Wooden directional and information signs have been installed for the administration and protection of the area and its users.

FIRE

The proposed Wilderness contains dense and highly flammable brush in the lower elevation ranges. In addition, summer and fall temperatures are high, while humidity is low. Adequate fire protection would therefore be essential.

During the critical fire season the area is open to use only by permit. This precaution reduces man-caused fires to some extent, but does not stop all man-caused fires, aeroplane crashes or the occurrence of lightning fires. Fire-fighting forces

must have access by trails and quick access by helicopter on well distributed, small, hand constructed helispots.

Historically, few fires have occurred here, but once started they are difficult and costly to control. Major fires that escaped from the initial attack have generally been confined to less than 10,000 acres, but have required 2 to 3 weeks to control.

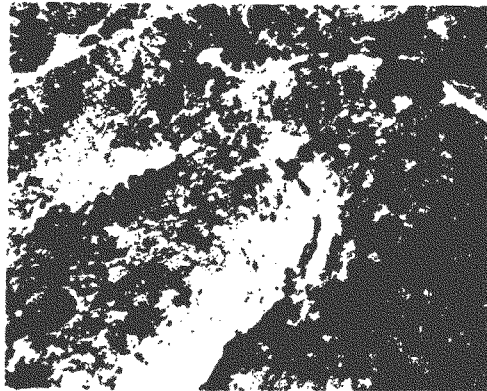
The threat to the Wilderness from large conflagrations sweeping into the area would remain a challenge. The boundary of this proposed Wilderness is very important and has been intentionally established wherever possible to allow the construction of peripheral fuelbreaks, and fire control access.

Approximately 70 percent of the boundary of this area would be located 250 feet below the crest of the ridge to permit the machine construction of effective fuelbreaks. For portions of approximately 12 miles of Wilderness boundary around the north end of this unit, provision is made for additional protection by means of a hand constructed fuelbreak inside the Wilderness if necessary.

In the event of fire the Forest Service would use whatever fire-fighting methods the situation requires, including use of machinery in building fuelbreaks and temporary roads.

The Forest Service would also take whatever steps are prudent to promptly revegetate burned areas to prevent damage, including, if necessary, use of machinery to do the work.

ARROYO SECO GORGE. Indians Road
in background is outside boundary.



Michael Caplin testimony on

36 The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

666

EXHIBIT 2, PG. 3

INSECTS AND DISEASE

A current insect threat is affecting Santa Lucia fir, as previously explained. Further study should be given this problem so that this species of fir can sustain itself.

There are no other known serious insect or disease problems in this proposed Wilderness. If such develop, the Forest Service would follow control, eradication or prevention practices that are consistent with general policies for insect and disease matters in managing National Forest Wildernesses.

NON-FEDERAL LANDS INSIDE BOUNDARY

The Ventana proposal contains 9 parcels of non-Federal land totaling 2510 acres. These ownerships range from 37 acres to 640 acres in size.

This private land is not occupied. The Forest Service will continue a plan of acquisition by exchange or purchase with each opportunity, until all private ownership is acquired. The two exclusions on the northerly boundary are considered unacquirable private parcels being developed as vacation ranches.

POOLS ON THE ARROYO SECO RIVER are attractive to the Sahermans.



103604

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

CONCLUSIONS

EXHIBIT 2, PG. 4

AREAS SUITABLE FOR WILDERNESS
DESIGNATION

About 55,000 acres within this proposed Wilderness have been managed as the Ventana Primitive Area since 1931. The Forest Service studies, comments submitted by other agencies of government, and the numerous comments made at the public hearing on June 7, 1967, and immediately following the hearing, show there is no reason to discontinue Wilderness-type management of this area. Rather, these studies and comments show that the Wilderness should include additional, contiguous areas having topography, vegetative cover, and remoteness which makes them suitable if adequate fire control facilities can still be provided.

After studying the area in light of the viewpoints submitted during and after the hearing, the Forest Service has concluded that areas labeled A through E, the original proposal shown on the map page 13 should be included in the proposal.

Addition A. These 3,491 acres are Wilderness-type land encompassing both banks of the Carmel River. This addition with due consideration to necessary fire control provisions will improve the Wilderness boundary, now a river and section line, to that of a natural ridge separating Bruce Creek and Miller Fork. This ridge is especially suitable for a machine constructed fuelbreak that is essential to control possible fires.

Addition B. Instead of using a section line it is recommended the boundary be extended easterly to include the entire Pine Valley basin. This 357 acre addition would establish the boundary on a prominent ridge, and would permit the continuance of the planned peripheral fuelbreak on this strategically located ridge.

Addition C. To the south of the Ventana Primitive Area is an extensive roadless area which includes the headwaters of the Big Sur and Arroyo Seco Rivers and Tassajara, Lost Valley and Logwood Creeks. Nestled midst the surrounding rugged country are Strawberry Valley, Indian Valley, and Lost Valley known for their Wilderness qualities. The northeasterly boundary of this 35,107 acre addition is a prominent ridge just east of Tassajara Creek. This ridge would be used to continue the necessary peripheral fuelbreak planned to begin in area A. The remainder of the easterly boundary includes the Arroyo Seco River and its spectacular gorge. The boundary is displaced 100 feet to the east of the thread of the channel of the river.

Addition C is bounded on the southwest by the Coast Range separating the Pacific Slope from the numerous drainages within the proposed Wilderness. This topographic boundary parallels but excludes a road and a planned peripheral fuelbreak. Logwood Creek is included in the northwest corner of Area C for the recommended boundary is displaced 100 feet southwest of the thread of the channel of the stream.

Addition D. These 241 acres would add similar and suitable land with Wilderness character. The boundary would be along a prominent ridge paralleling the peripheral fuelbreak.

Addition E. The prominent Skinner Ridge would make a topographic boundary compared to the section lines of the Primitive Area boundary. This 1,125 acre addition will include headwaters of Turner Creek and Skinner Creek, a desirable addition with Wilderness qualities. A fuelbreak is planned along this ridge.

AREAS NOT RECOMMENDED FOR
WILDERNESS

Three small areas within the Primitive Area as shown on the map on page 13 are recommended for declassification. Units I and II totalling 420 acres, are proposed for deletion because they are in private ownership, considered unacquirable and the anticipated use would be nonconforming in nature. Unit III, 30 acres, is proposed for deletion to provide for a topographic boundary rather than arbitrary legal subdivisions.

A preponderance of those commenting both orally and in writing advocated the inclusion in the Wilderness the area labeled F and G on the map on page 13. The Forest Service concluded it is desirable that these areas not be included in the Wilderness. Area F contains parcels of private land and adjoins other parcels of private land. The owners of these lands are not interested in disposal. This ownership pattern invites fire, access, and management problems plus use non-conforming to Wilderness. The north and east boundaries of Area F are predominantly section lines crossing canyons and ridges. Such a boundary does not lend itself to the construction of an adequate peripheral fuelbreak. Area G contains the Willow Creek drainage. It drains to the east from a key, well defined, prominent ridge which forms a portion of the proposed boundary of Addition C.

The prime objective on the easterly boundary of

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

EXHIBIT 2, PG. 5

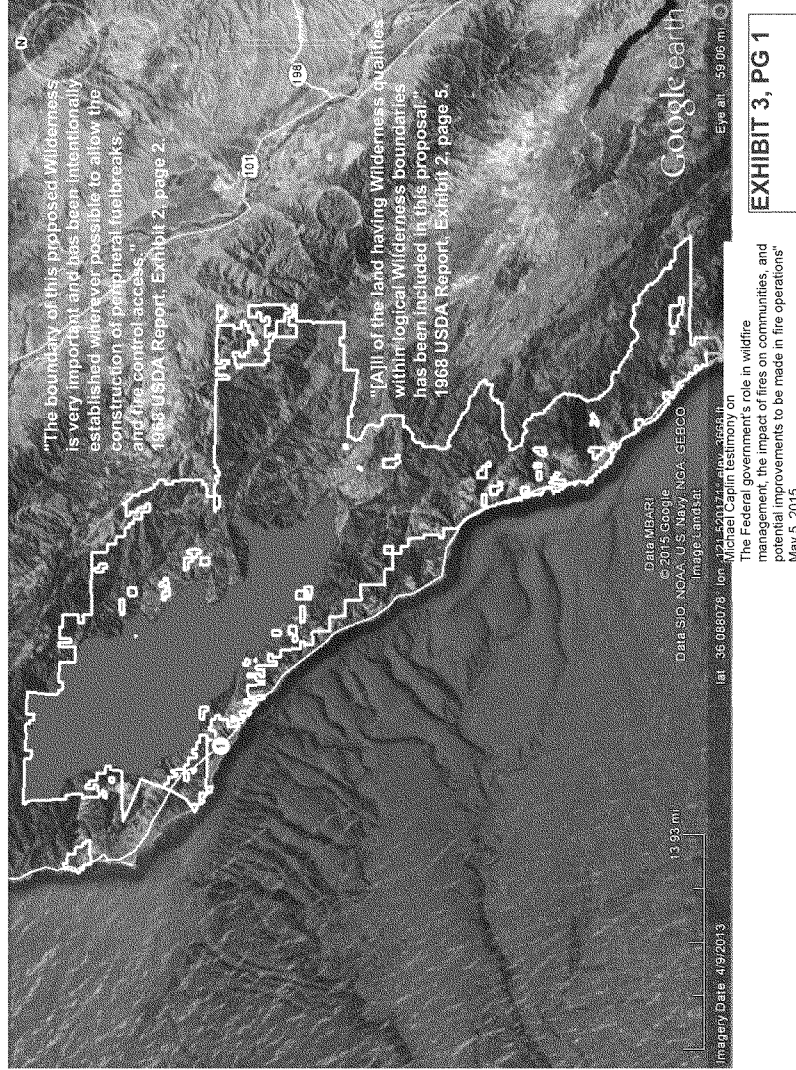
this Wilderness proposal is to establish and maintain adequate continuous peripheral fuelbreaks on key ridges to protect the area from sweeping conflagrations. The boundary as proposed is on such a key ridge 20.5 miles in length. To include Areas F and G in this proposal would cancel this objective.

In general, the boundary on the north is the Forest boundary while that on the east is topographic and controlled by private land, roads and nonconforming Wilderness use. The proposed area is bound on the south by an access fire road, an

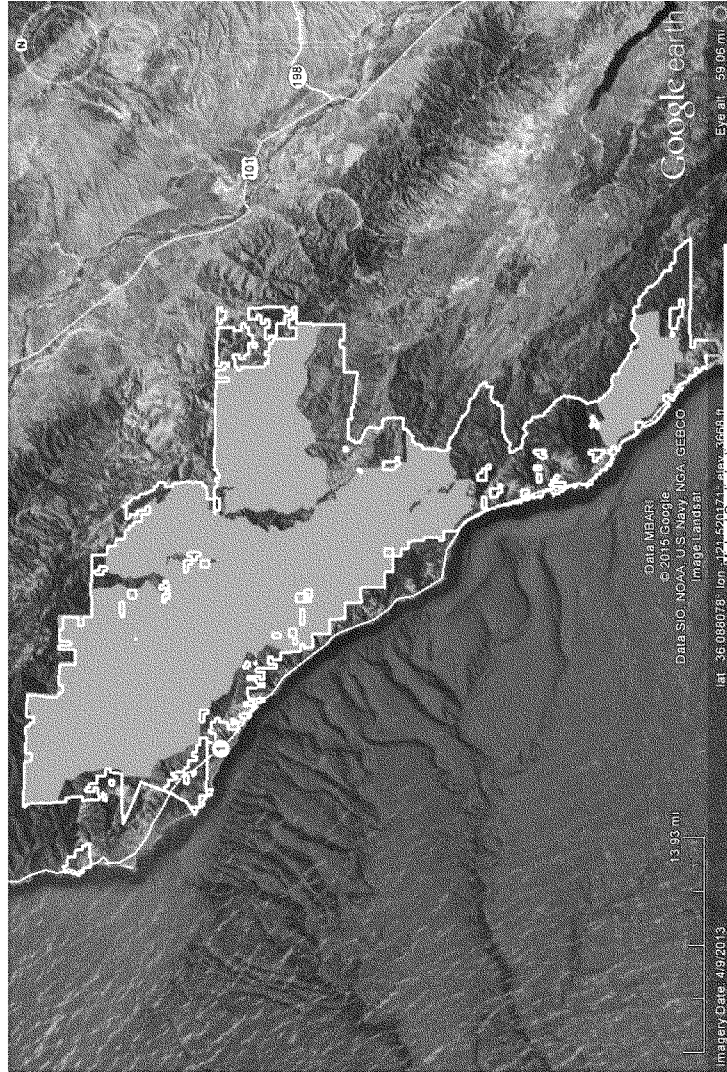
east-west road, connecting the Coast Ridge Road and Indians Road. The southerly portion of the western boundary is the Coast Ridge containing a forest road which route may become the approximate location of a scenic highway if, or when, constructed. The route should be kept open and available for study and determination at a later date. The northerly portion of the western boundary is topographic and controlled by a State Park, private lands, and uses and roads not conforming to Wilderness. Therefore, all of the land having Wilderness qualities within logical Wilderness boundaries has been included in this proposal.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

Blue = Ventana Wilderness when first designated in 1969. 98,000 acres.



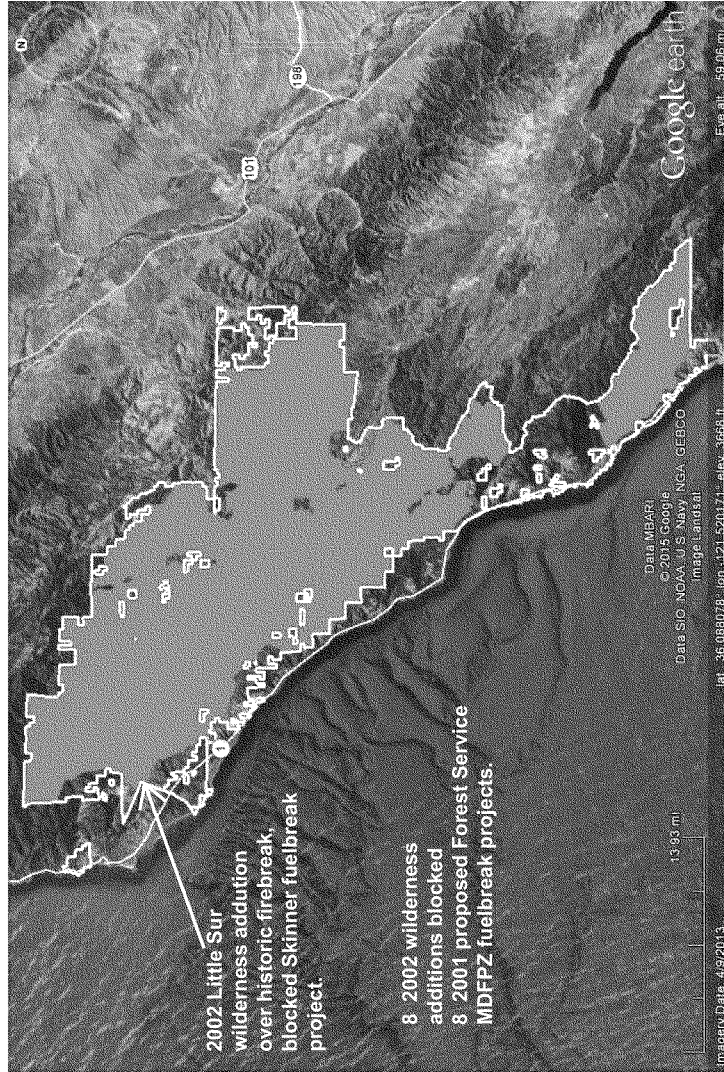
Red = Ventana Wilderness after 1978, 1984 and 1992 additions. 199,750 acres.



The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations" May 5, 2015.

EXHIBIT 3, PG 2

Red = Ventana Wilderness after 2002 additions. 236,860 acres.



The Federal government's role in wildfire management, the impact of fires on communities, and potential improvements to be made in fire operations" May 5, 2015.

EXHIBIT 3, PG 3

EXHIBIT 4, PG. 1

United States
Department of
Agriculture

Forest
Service

Los Padres
National
Forest

Monterey Ranger District
406 S. Mildred
King City, CA 93930
(831) 385-5434

File Code: 1950
Date: August 13, 2001

Dear Interested Party:

The Monterey Ranger District of the Los Padres National Forest is proposing to implement a defensible fuel profile zone (DFPZ) project (**Monterey DFPZ Project**) on National Forest system lands. Forest Service personnel are preparing to conduct an analysis of the proposed project area within the boundary of the Monterey Ranger District on selected lands outside the Ventana and Silver Peak Wilderness areas. Please see the enclosed map for a general location of the proposed project.

The purpose of this letter is to invite you to participate in the analysis process by providing your comments and any concerns you may have about this proposed project. To encourage your informed participation in this planning process, this letter includes a description of the proposed action and the purpose and need for action.

PROPOSED ACTION

Trained specialists with the Forest Service are planning to apply fuels reduction treatments to establish defensible fuel profile zones (DFPZs) within ten identified units that cover a total of approximately 18,760 acres. Primary focuses for this project are travel corridors (roads and trails), campgrounds, National Forest System Lands adjacent to private property, administrative sites, and existing firelines. Treatments used to establish DFPZs include:

- Pruning, clearing and chipping hazardous fuels;
- Burning of fuels using broadcast and spot burning methods;
- Establishment of shaded areas by planting native tree species; and
- Managing for native grasses.

Implementation would begin in the fall of 2001 and continue over the next ten years. Individual areas would be prioritized for burning to achieve desired results. Burning would be applied when moisture and air quality conditions meet prescription criteria. Prescription criteria are most likely to be met after fall season rains when moisture levels would limit fire severity and still be low enough to achieve desired levels of fuel consumption.

In general, fuel profiles would be changed to:

- Break-up horizontal and vertical continuity;
- Reduce fire prone live fuels by managing for: younger vegetation, native grasses, and trees;
- Reduce quantity of dead fuels; and
- Use Forest Service facilities (campgrounds and administrative sites) to create models of defensible space.



Caring for the Land and Serving People

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

Defensible Space

DFPZs would be created on either side of roads, and around administrative and special use facilities to serve as safety zones, pre-attack zones, and escape routes during fire situations. A variable width buffer not to exceed 1,000 feet on each side of the road would be created by removing dead fuels, pruning live brush and trees, planting native trees, and managing for native grasses where appropriate. Treatments would vary depending on position on slope, soils conditions for plant establishment and growth, and aspect.

Fuels around campgrounds would be managed so they could serve as safety zones in the event of fire. A 1,000-foot buffer would be created by removing dead fuels, pruning live brush and trees, and managing for native grasses where appropriate. Measures would be taken to ensure that unlawful access to open areas is controlled around campgrounds.

Native grasses would be managed by burning and seeding where appropriate. This would be implemented in small (15 to 20 acre) areas over time in coordination with a qualified botanist. Natural seeding would be encouraged whenever possible. Where prescribed fire and/or reestablishment of native grasses are proposed, maintenance burning would be implemented about every seven years.

Shaded DFPZs would be established by planting native tree species. Species mix for tree planting would be based on types of trees found presently or historically in the vicinity. Species to be considered would be: ponderosa pine, incense-cedar, sugar pine, Santa Lucia fir, and madrone. Any seeding or planting that occurs would be done using locally collected seed.

The Forest Service would work with State and County Fire Departments in a cooperative effort to create safety zones around private homes and facilities.

Treatment Units

The following table describes proposed actions by treatment unit.

UNIT	ACRES	PROPOSED ACTION
Arroyo	1,630	Establish variable width DFPZs up to 1,000 feet on each side of road. Apply prescribed fire at regular intervals and reestablish native grasses around the Horse Bridge/Santa Lucia Creek area. Establish variable width DFPZs along trails outside of wilderness.
Carmel	165	Prescribed fire would be applied to provide buffering between the wilderness and private property.
Cone	2,605	Establish variable width DFPZs up to 1,000 feet on each side of road. Plant trees to develop shaded DFPZs as part of roadside corridor where appropriate.
Manuel	400	Manage dozer lines and safety zones to favor native grasses. Fuels profiles would be managed so line could be used without repeated dozer entry. At specific locations where conditions are favorable, reestablish native grasses and/or plant trees to create a shaded DFPZ over ¼ mile segments.
Park	2,630	Create and maintain 1,000-foot DFPZs around campgrounds. Use prescribed fire to discourage the spread of noxious weeds.
Piney	1,710	Burn on a regular basis in the winter after the road has been closed.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

EXHIBIT 4, PG. 3

UNIT	ACRES	PROPOSED ACTION
Reliz	5,160	Continue on-going coordination with property owners to apply prescribed fire across ownership boundaries.
Ridge	1,975	Manage segments of existing dozer line for native grasses and shaded DFPZ. Establish a variable width DFPZ up to 1,000 feet on each side of road.
Skinner	700	Manage existing dozer line and safety zones as a long-term strategic facility. This would be achieved by treating small patches over time. Treatments include discouraging growth of non-native grasses through periodic burning, brush cutting, and reintroduction of native grasses.
Tassajara	1,785	Create variable width DFPZs up to 1,000 feet wide each side of road outside the wilderness area using a mix of the following methods: <ul style="list-style-type: none"> • Up to 100 acre prescribed fire projects, thinning, and brush piling; • Create a variable width road corridor with reduced amounts of large fuel by offering fuelwood sales for areas within 300 feet of the road; and • Manage for native grasses through periodic burning and seeding small areas where appropriate.

PURPOSE AND NEED FOR ACTION

The purpose of this project is to meet the following objectives:

- Protect highly valuable real estate within and adjacent to the National Forest boundary;
- Protect watershed values in the Carmel and Arroyo Seco watersheds;
- Reduce risk to private property;
- Reduce potential for damage to resources by reducing potential for high intensity fires;
- Implement small, strategically located projects that can provide anchor points, pre-attack zones, and areas of reduced intensity during unplanned fire events;
- Create corridors and safety zones around public use facilities such as roads, campgrounds, and special use permit sites;
- Provide evacuation routes to forest users and residents in the event of wildfire;
- Lower risk of fire ignition, reduce intensity once ignition occurs, and break-up continuity to inhibit and slow spread of wildfires;
- Limit the intensity of unplanned fires at strategic locations;
- Protect historic structures;
- Reduce risk of establishment and spread of noxious weeds; and
- Reduce risk of large fires by managing for younger vegetation and broken continuity.

COMMENTS

The proposed action will be fully analyzed prior to any decision on final project design. For this project to result in the best possible outcome for people and the environment please send us any issues, concerns, suggestions or information you may have relating to this proposal. Opinions and values will be noted, but the intent of the process is not to serve as a public opinion poll.

Purpose of This Letter:

To identify the range of issues and determine their significance.

An issue is:

A point of discussion, dispute or debate about the environmental effects.

Issues are Used:

To focus the analysis and determine if any alternatives to the proposed action need to be developed.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

EXHIBIT 4, PG. 4

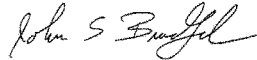
The Los Padres National Forest has hired Forest Service Environmental Assessment specialists located in Happy Camp, California to work closely with the local specialists, guiding the analysis and preparing the decision document. If you would like additional information please contact one of the following people:

Names	Address	Phone	Fax	email
Annie Buma	c/o Happy Camp Ranger District	530-493-1725	530-493-1775	abuma@fs.fed.us
Judy Hahn	P.O. Box 377	530-493-1721		jhahn@fs.fed.us
Fran Smith	Happy Camp, CA 96039	530-493-1788		fsmith@fs.fed.us

Please send any issues or written comments to one of the individuals listed above at the indicated address by August 24, 2001. Comments are a matter of public record and as such may be provided to interested parties upon request.

Thank you for your participation in this process.

Sincerely,



JOHN S. BRADFORD
Acting District Ranger

encl.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

The Library of Congress > THOMAS Home > Bills, Resolutions > Search Results

EXHIBIT 5, PG. 1

Bill Summary & Status 107th Congress (2001 - 2002) H.R.4750 All Congressional Actions

[NEW SEARCH](#) | [HOME](#) | [HELP](#) |

[⌂ Back to Bill Summary and Status](#)

[Print](#) [Subscribe](#) [Share/Save](#)

H.R.4750
Latest Title: Big Sur Wilderness and Conservation Act of 2002
Sponsor: [Rep. Farr, Sam](#) [CA-17] (introduced 5/16/2002) [Cosponsors](#) (10)
Latest Major Action: Became Public Law No: 107-370 [GPO: [Text](#), [PDF](#)]

ALL ACTIONS:

5/16/2002:
Referred to the House Committee on Resources.

5/20/2002:
Referred to the Subcommittee on National Parks, Recreation and Public Lands.

5/20/2002:
Referred to the Subcommittee on Forests and Forest Health.

11/15/2002 2:04am:
Mr. Hansen asked unanimous consent to discharge from committee and consider.

11/15/2002 2:04am:
Considered by unanimous consent. (consideration: CR 11/14/2002 [H8923-8924](#))

11/15/2002 2:04am:
Committee on Resources discharged.

11/15/2002 2:04am:
On passage Passed without objection. (text: CR 11/14/2002 [H8923-8924](#))

11/15/2002 2:04am:
Motion to reconsider laid on the table Agreed to without objection.

11/15/2002:
Received in the Senate, read twice.

11/20/2002:
Passed Senate without amendment by Unanimous Consent. (consideration: CR 11/19/2002 [S11652-11655](#))

11/20/2002:
Message on Senate action sent to the House.

11/20/2002:
Cleared for White House.

12/10/2002:
Presented to President.

12/19/2002:
Signed by President.

12/19/2002:

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

Bill Summary & Status - 107th Congress (2001 - 2002) - H.R. 4750 - All...

<http://thomas.loc.gov/cgi-bin/tdquery/z?d107:HR04750:@::X>

Became Public Law No: 107-370.

EXHIBIT 5, PG. 2


Stay Connected with the Library [All ways to connect >](#)

Find us on
 

Subscribe & Comment
[RSS & E-Mail](#) [Blogs](#)

Download & Play
[Podcasts](#) [Webcasts](#) [iTunes U](#)

[About](#) | [Press](#) | [Site Map](#) | [Contact](#) | [Accessibility](#) | [Legal](#) | [External Link Disclaimer](#) | [USA.gov](#)

[Speech Enabled](#) 

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

[Excerpt. Highlight added.]



United States
Department
of
Agriculture

Forest
Service

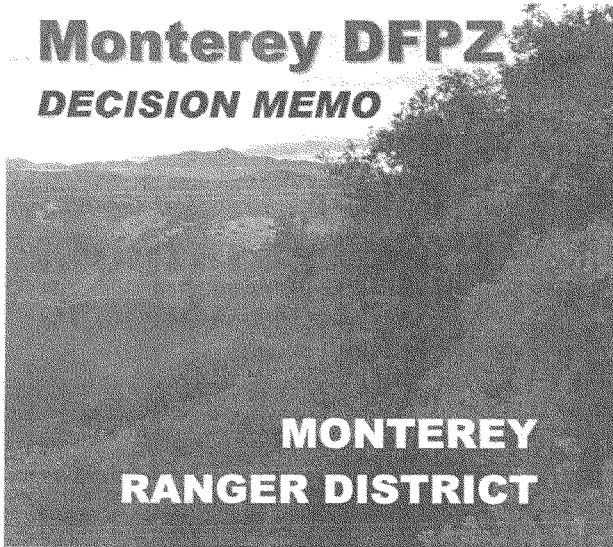
Pacific
Southwest
Region

Monterey
County

October
2004



Monterey DFPZ DECISION MEMO



LOS PADRES NATIONAL FOREST

Caring for the land and Serving People

EXHIBIT 6, PG. 2

More specific information on treatments by unit can be found in **Appendix A**. A breakdown of treatment acres by unit and proportion of unit to be treated are shown in **Table 2**. After design of this project the *Big Sur Wilderness and Conservation Act* was passed in May of 2002 (H.R. 4750). This act added lands to the wilderness preservation system on the Monterey Ranger District Los Padres National Forest. There was no wilderness addition acres included in the Piney or Reliz Units of the Monterey DFPZ. Table 2 displays the acres of each unit, the acres treated by treatment type, % of unit treated, and amount of dozer line needed to accomplish the broadcast burning.

DFPZ Unit	Total Acres	Wilderness Addition Acres	Broadcast Burn Acres	Pile Burn Acres	Total Treatment Acres	% of Unit Treated	Annual Treatment (ac/yr)	Dozer Lines
Piney	1,710	0	1,400	100	1,500	88	500 (over 3 entries)	Crush 1.5 mi.
Reliz	5,160	0	3,300	300	3,600	70	400	<1 mile
TOTAL	6,870	0	4,700	400	5,100	75	400 to 500	<2.5 miles

Broadcast burning will be applied to a total of 4,700 acres and pile burn treatments will be applied to 400 acres. Total treatment acres are 5,100 and will be accomplished over the next ten years.

To move these units toward desired conditions over 70% of the Chamise, Chaparral, and sagebrush vegetative types are to be treated by broadcast burning. The desired condition for chaparral stands is to have a mosaic of age classes. Not all vegetation will be burned even where treatment is applied. The broadcast burn prescription and ignition techniques used will create a mosaic of burn intensities ranging from unburned areas to complete removal of the vegetation. In most cases broadcast burning will be controlled using natural features, roads, firelines, and existing dozer lines. If these control features are not present, firelines constructed with hand tools will also be used. Broadcast burn units could be as large as 400 to 500 acres in size depending on the location of the control lines.




There is less than three miles of dozer use planned for control lines in the two units. The dozer work is located outside of sensitive view areas, riparian areas, and wilderness. In the Piney Unit approximately 1.5 miles of vegetation will be crushed by dozer to create a fuel break which will act as control lines. In the Reliz Unit less than 1 mile of existing dozer line will be opened for control lines. Maps of the dozer work for control lines are displayed in Appendix F.

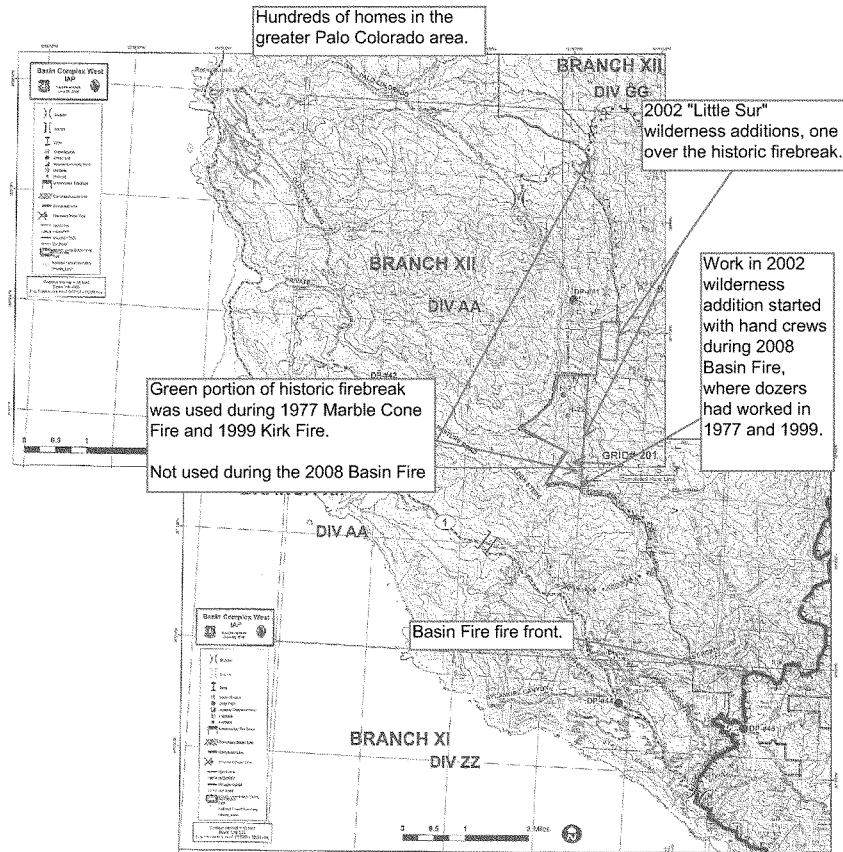
The pile burning treatments will be variable in size and shape and applied along roads and existing fire lines. Variable width DFPZs are mapped to maximum widths (1,000 feet on each side of roads and 600 feet on existing firelines) to allow flexibility for treatments of small areas (no larger than 20 acres) and to allow for use of existing holding features. Total acres treated will not exceed those displayed in **Table 2**. Treatments will be applied to reduce fuel continuity while maintaining natural vegetation patterns and age classes.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"

EXHIBIT 7, PG. 1

Basin Fire Perimeter as of 6/27/08 - 10:00 Hrs

-  Basin Complex / Gallery Perimeter
 Unused Historic Skinner Ridge Firebreak
 2002 Little Sur Wilderness Additions



Basin Fire Perimeter as of 6/29/08 - 22:00 Hrs

- Basin Complex / Gallery Perimeter
- Unused Historic Skinner Ridge Firebreak
- 2002 Little Sur Wilderness Additions

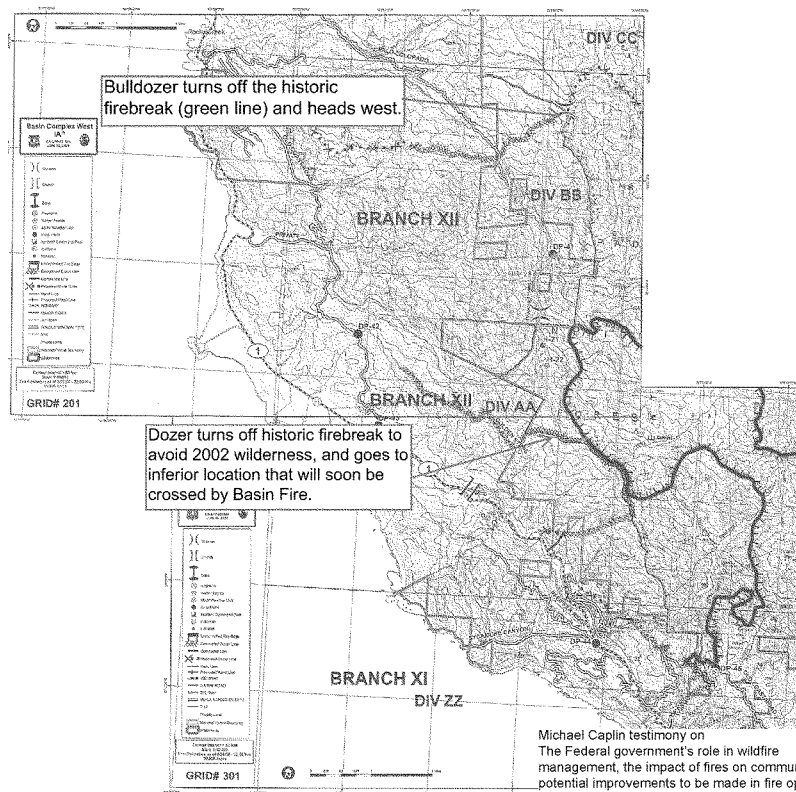





EXHIBIT 7, PG. 3

Basin Fire Perimeter as of 7/01/08 - 22:00 Hrs

-  Basin Complex / Gallery Perimeter
 Unused Historic Skinner Ridge Firebreak
 2002 Little Sur Wilderness Additions

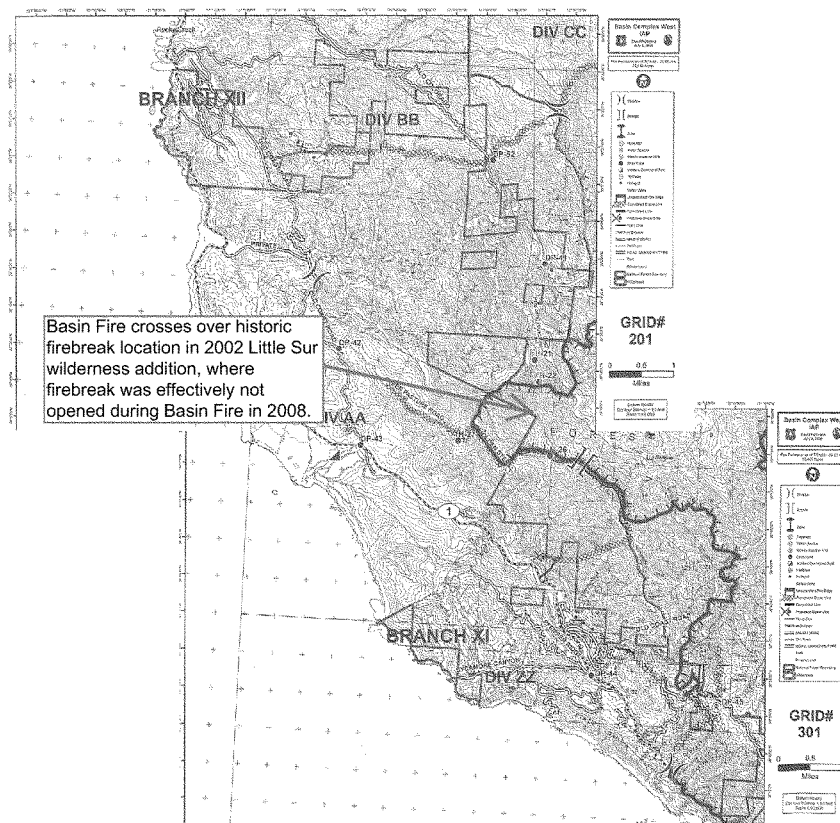


EXHIBIT 8, PG. 1

United States
Department of
Agriculture

Forest
Service

Los Padres
National Forest

Monterey Ranger District
406 South Mildred
King City, CA 93930
(831) 385-5434
TDD: (805) 968-6790

File Code: 1950-3

Date: November 20, 2012

Dear Interested Party:

The Los Padres National Forest, Monterey Ranger District, requests your comments on our proposed action for a **Strategic Community Fuelbreak Improvement Project**.

This proposed action is the first formal stage of the National Environmental Policy Act (NEPA) process for this project. It is our intent to publish a Draft Environmental Impact Statement (DEIS) in November 2013 for public review. The DEIS will offer another opportunity for comments before we publish our Final EIS.

This project will focus on pre-suppression fire management within the wildland/urban interface threat zone on the peripheral of the northern Monterey Ranger District. The purpose of this project is to enhance protection for at-risk communities from wildfire. This project will set the stage for future management of fire and ecological restoration in both wilderness and non-wilderness.

The need for this project is to prepare historically used strategic firelines in a condition that will:

- increase wildland fire suppression efficiency when in proximity to communities and related infrastructure
- reduce wildfire risk to life and property
- reduce suppression costs
- reduce adverse fire suppression impacts on the landscape

Proposed Action

The proposed action is to re-establish and maintain 24.1 miles of historically used fuelbreaks – all of which originated as firelines - within the wildland urban interface threat zones on National Forest System lands; approximately 7.5 miles within wilderness and 16.6 miles outside of wilderness. The project would be accomplished over a period of 10 years, as funding and resources become available. Fuelbreak treatments would be as follows:

Non-Wilderness

Fuelbreaks would be constructed and maintained every 3-5 years with a combination of hand thinning with chainsaws, hand and machine piling, pile burning and mastication.



Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
Caring for the Land and Serving People
May 5, 2015.

Wilderness

In accordance with the Wilderness Act, enabling legislation, and Forest Service Policy, fuelbreaks would be constructed manually using chainsaws, hand piling and pile burning and then maintained every 3-5 years with traditional tools through a combination of hand thinning, hand piling and pile burning. A monitoring and adaptive management program will be developed to evaluate the rate of vegetative regrowth on the treated fuelbreaks to determine if available workforce is sufficient to maintain fuelbreak integrity with traditional tools or whether additional administrative actions, such as use of chainsaws, will be needed to assist in maintenance.

Strategic Community Fuelbreak locations and dimensions¹ are as follows:
(please refer to attached Project Vicinity Map)

(1a) Palo Colorado Vicinity - Non-Wilderness

Establish a maximum 150 foot wide fuelbreak on the historic fireline adjacent to the Skinner Ridge Trail (FDT 1E04) between Botchers Gap and Skinner Ridge, a distance of 1.3 miles.

Establish a maximum 150 foot wide fuelbreak on the historic fireline along Skinner Ridge between the wilderness boundary in Section 18 (near Turner Creek) and Pico Blanco Boy Scout Camp, a distance of 2.8 miles.

Establish a fuelbreak that overlaps the existing Mescal Ridge Road, covering 25 feet north of the road edge to 75 feet south of the adjacent ridge center. Fuelbreak would be a maximum of approximately 300 feet wide by 0.6 miles long.

(1b) Palo Colorado Vicinity - Wilderness

Establish a maximum 150 foot wide fuelbreak on the historic fireline between the wilderness boundary in Section 18 (just south of the Turner Creek trailhead) and Devils Peak, a distance of one mile.

(2a) Palo Colorado to Big Sur Vicinity – Non-Wilderness

Establish a maximum 150 foot wide fuelbreak on the historic fireline between the National Forest boundary at Post Summit, across Cabezo Prieto ridge, and where the Mt. Manuel Trail (FDT 2E06) crosses the wilderness boundary in Section 20, a distance of 2.8 miles.

(2b) Palo Colorado to Big Sur Vicinity – Wilderness

Establish a maximum 150 foot wide fuelbreak on the historic fireline between Post Summit and the Little Sur River, a distance of 1.8 miles.

¹ Fuelbreak widths are maximum values. The actual widths may be limited by factors such as width of the ridge and/or proximity to the wilderness boundary.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

Establish a maximum 150 foot wide fuelbreak on the historic fireline from where the Mt. Manuel Trail (FDT 2E06) crosses the wilderness boundary in Section 20 to the Big Sur Wild River boundary, a distance of 0.8 miles.

(3) Big Sur Vicinity - Non-Wilderness

Establish a fuelbreak along the historic fireline adjacent to and/or encompassing the North Coast Ridge Road (FDR 20S05) between the Terrace Creek Trailhead (FDT 3E220) and Anderson Peak on National Forest System lands, a distance of 6.8 miles. The maximum width between the Terrace Creek Trailhead and Cold Springs will be 150 feet; maximum width between Cold Springs and the Tanbark Trail will be 300 feet; maximum width between the Tanbark Trail and Anderson Peak will be 150 feet.

Establish a 150 foot wide fuelbreak on Partington Ridge adjacent to and/or encompassing the Deangula Trail (FDT 2E07) between the North Coast Ridge Road (FDR 20S05) and the National Forest boundary, a distance of 0.8 miles.

Establish a fuelbreak encompassing the Tan Bark Trail between the North Coast Ridge Road (FDR 20S05) and the Forest Boundary, a distance of 0.8 miles. Commencing at the North Coast Ridge Road and traveling west towards the National Forest boundary, the first approximate 600 feet in length will be a maximum of 300 feet wide. The remaining length to the Forest boundary will be a maximum of 150 feet wide.

(4a) Cachagua and Jamesburg Vicinity - Non-Wilderness

Establish an anchor point through the use of prescribed fire and/or hand thinning with chainsaws, hand and machine piling, pile burning, and mastication around the Chews Ridge Lookout Tower and the Monterey Institute for Research and Astronomy Observing Station. Acreage is approximately 64 acres.

Establish a 150 foot wide fuelbreak on the historic fireline along Chews Ridge between the Chews Ridge Lookout Tower and north 0.7 miles to the wilderness boundary.

(4b) Cachagua and Jamesburg Vicinity - Wilderness

Establish a 150 foot wide fuelbreak on the historic fireline along Hennicksons/Chews Ridge on National Forest System lands between the National Forest boundary above Los Padres Dam and wilderness boundary near Tassajara Road, a distance of 3.9 miles.

Collaboration

To exchange information and work together towards agreement on conservation goals, the Monterey Ranger District initiated Firescape Monterey an informal collaborative group comprised of community and stakeholder partners who promote an all-lands approach to both protection of life and property affected by wildfire and healthy resilient ecosystems through collaborative stewardship. With facilitation and guidance by the Fire Learning Network, and a

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

EXHIBIT 8, PG. 4

focus on ecological restoration, participants in Firescape Monterey have identified five key important landscape values: Fire Adapted Human Communities, Natural and Wilderness Qualities, Biodiversity, Cultural Resources, and Watersheds. While Firescape Monterey continues to work towards collaborative and financially supported efforts among all land managers to accelerate the pace of landscape restoration, the Los Padres National Forest will focus our work sequentially in meeting goals developed collaboratively. This project is a key element of an overall district-wide planning process to expand and develop partnerships to increase organizational capacity to meet landscape restoration goals.

The Los Padres National Forest requests your comments on this proposed action. A 45-day comment period will commence on the publication date of a "notice of intent to prepare an environmental impact statement, Strategic Community Fuelbreak Improvement Project" in the Federal Register. Date of publication is expected between November 29 and December 4, 2012. If you do not have access to the Federal Register, please contact me and I will provide the date of publication as soon as it is published.

Two public meetings are scheduled to provide the public with an opportunity to engage with the Forest Service in discussions regarding the proposed action and process of the environmental impact statement.

December 4, 2012, 5:30pm – 7:30pm at the U. S. Forest Service Monterey District office:
406 South Mildred Ave., King City, CA 93930

December 6, 2012, 5:30pm – 7:30pm at the U. S. Forest Service Big Sur Station: 47555
Highway 1, Big Sur, CA 93920.

It is important that reviewers provide their comments at such times and in such manner that they are useful to the agency's preparation of the environmental impact statement. Therefore, comments should be provided prior to the close of the comment period and should clearly articulate the reviewer's support, concerns and contentions.

Include the following information with your comments: your name, mailing address, email (optional), and telephone number; the project name: Strategic Community Fuelbreak Improvement Project; and site-specific comments about the proposed action, along with supporting information you believe will help identify issues, develop alternatives, or predict environmental effects of this proposal. The most useful comments provide new information or describe unwanted environmental effects potentially caused by the proposed action. If you reference scientific literature in your comments, you must provide a copy of the entire reference you have cited and include rationale as to how you feel it is pertinent to the Strategic Community Fuelbreak Improvement Project. Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record for this proposed action.

Address: Send written comments to Los Padres National Forest, Monterey Ranger District, 406 South Mildred Ave., King City, CA. 93930, attention: Jeff Kwasny. Comments may also be sent via facsimile to 831-385-0628, or via e-mail to: comments-pacificsouthwest-los-padres-monterey@fs.fed.us.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

EXHIBIT 8, PG. 5

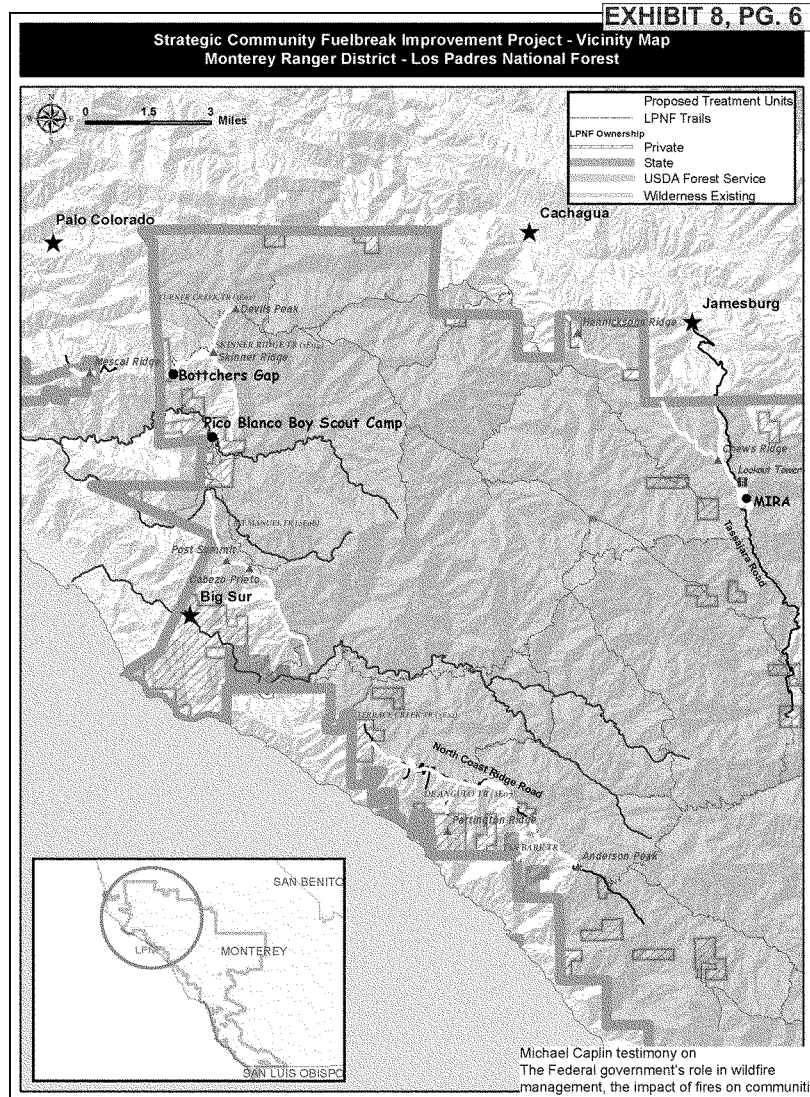
Additional information regarding this proposed action can be obtained from Jeff Kwasny, Project Team Leader, at Big Sur Station #1, 47555 Highway 1, Big Sur, CA 93920, (831)-667-1126, OR Timothy Short, District Ranger, at 406 South Mildred Ave., King City, CA 93930, (831)-385-5434.

Sincerely,

/s/ Timothy J. Short
TIMOTHY J. SHORT
District Ranger

Enclosed: Project Vicinity Map

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.



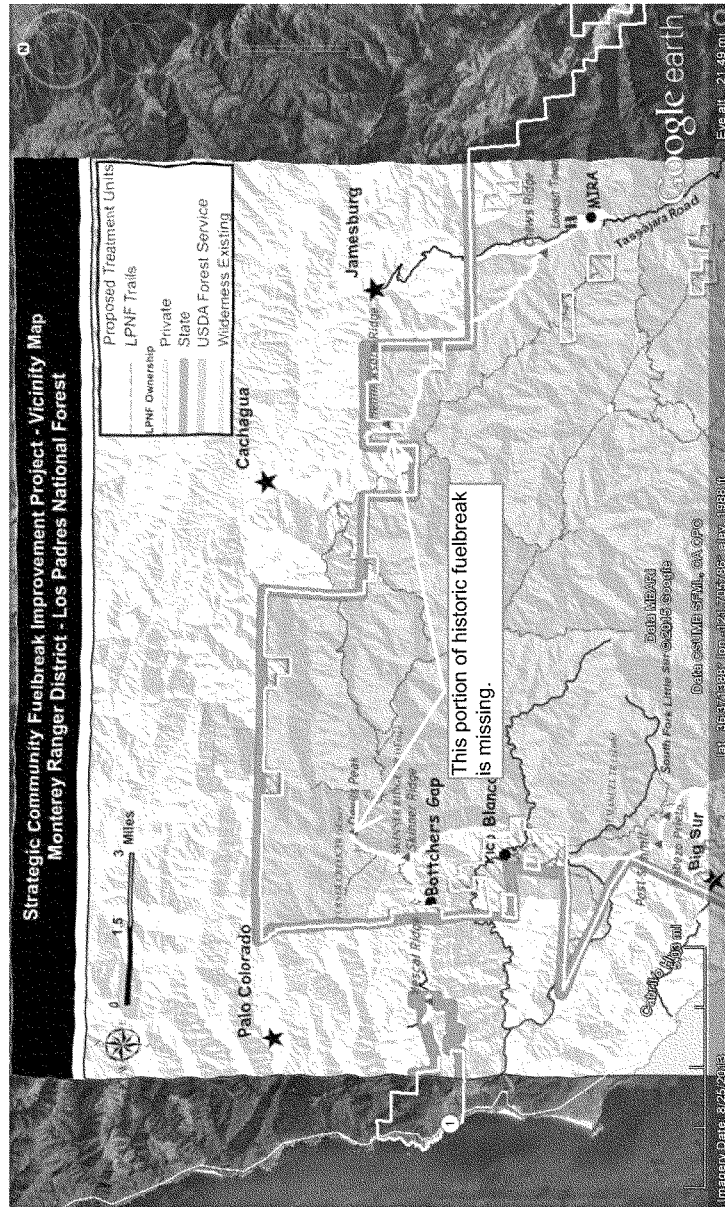


EXHIBIT 9, PG. 1

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

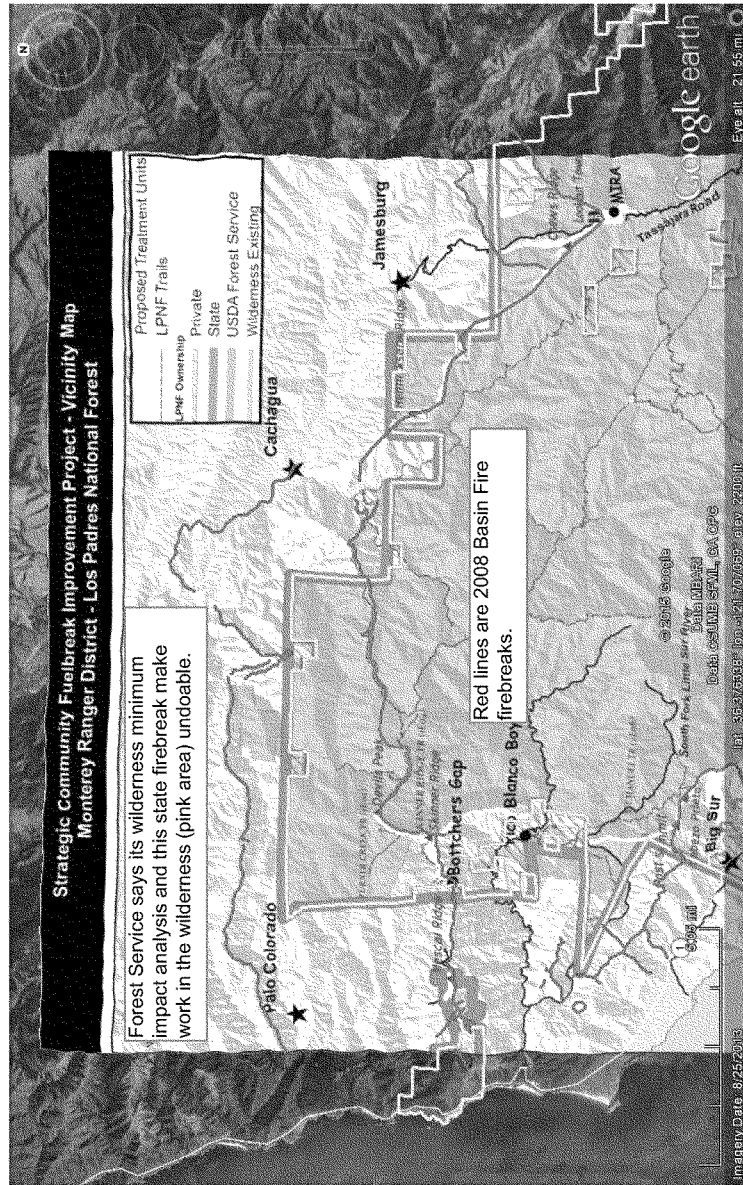
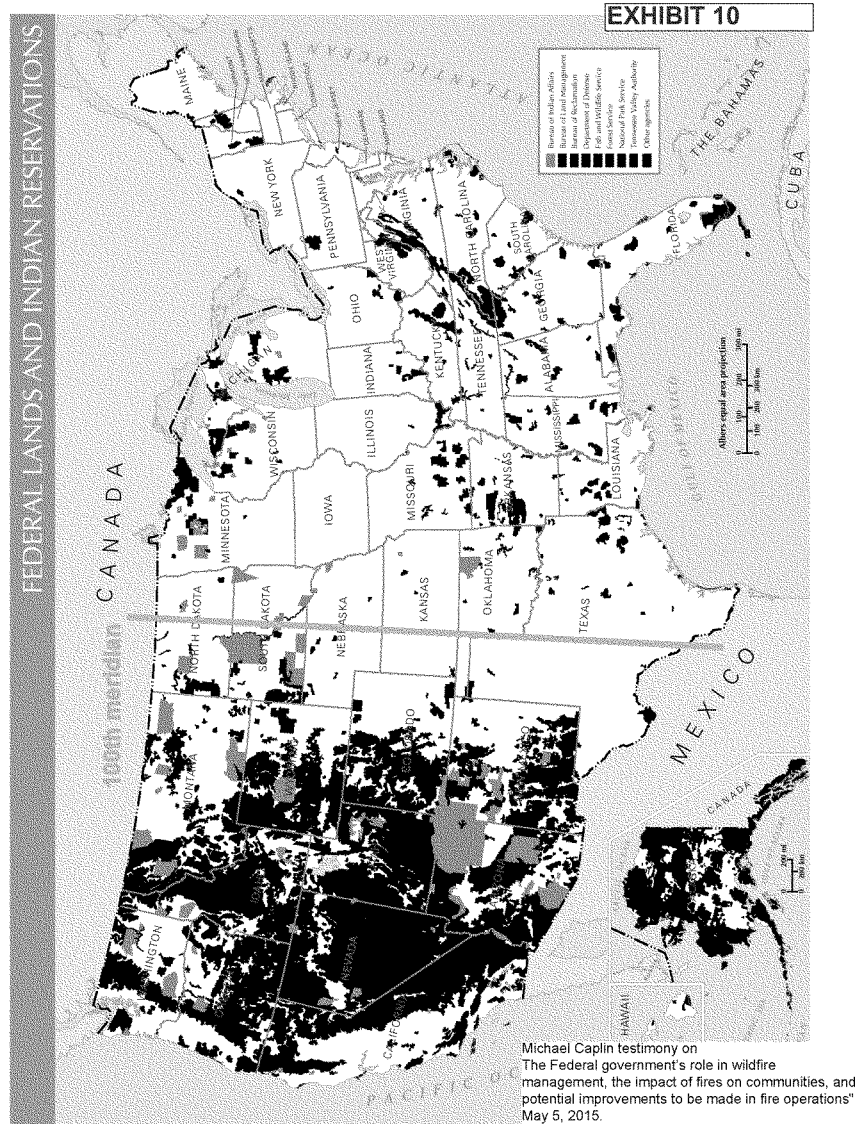


EXHIBIT 9, PG. 2

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.





Wildfire fuels left in creek after fuel reduction project due to over-regulation of wetlands/waterways.

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.

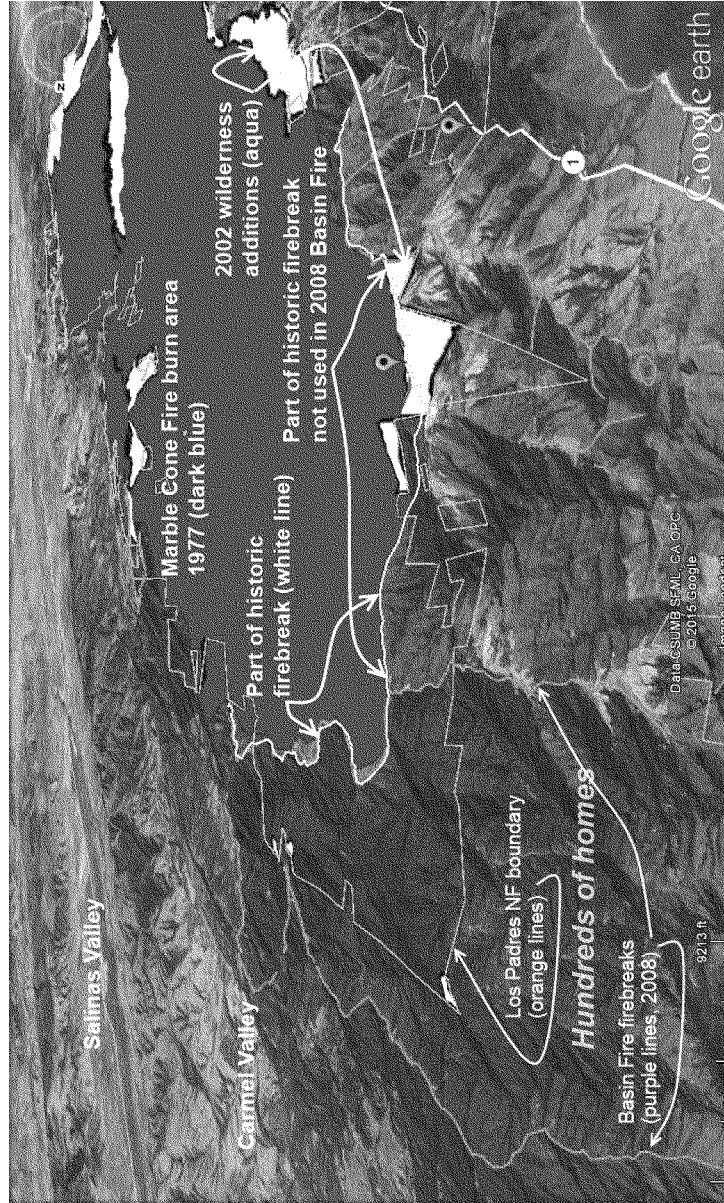
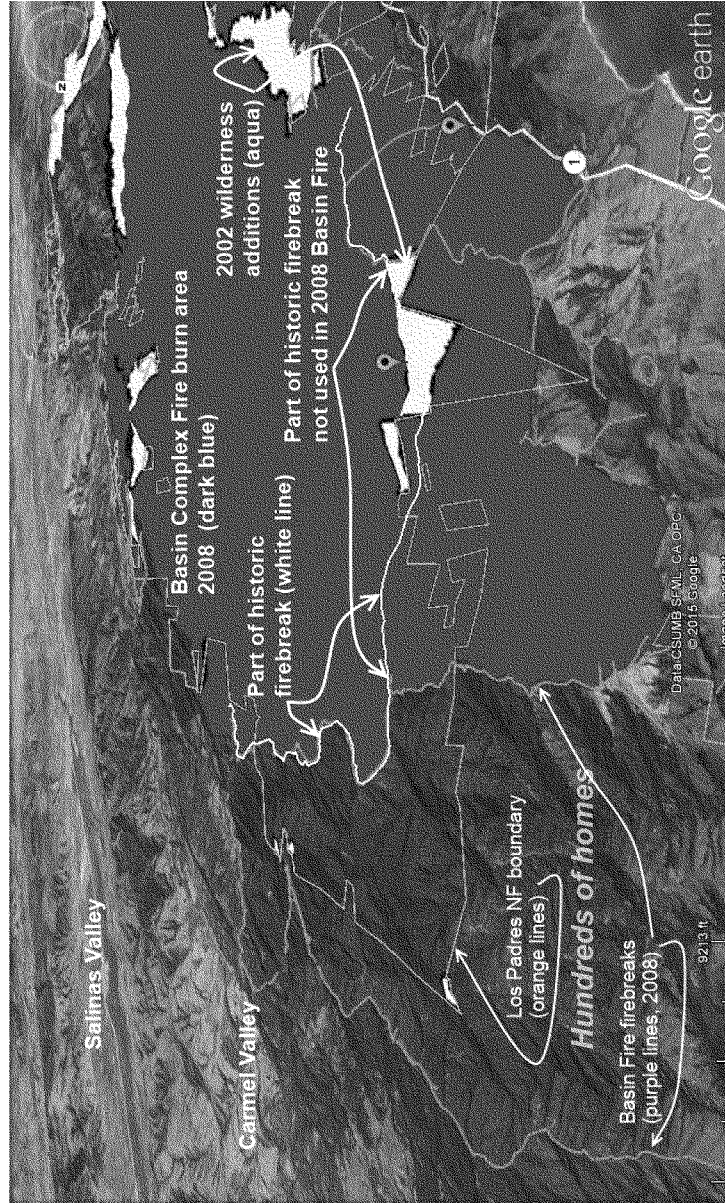


EXHIBIT 12, PG 1

Michael Caplin testimony on
The Federal government's role in wildfire
management, the impact of fires on communities, and
potential improvements to be made in fire operations"
May 5, 2015.



Michael Caplin testimony on
 The Federal government's role in wildfire
 management, the impact of fires on communities, and
 potential improvements to be made in fire operations"
 May 5, 2015.

EXHIBIT 12, PG 2

PARTNER CAUCUS on FIRE SUPPRESSION FUNDING SOLUTIONS

MAY 1, 2015

Support the Wildfire Disaster Funding Act

Dear Members of Congress,

Please support the Wildfire Disaster Funding Act, H.R. 167 and S. 235. This important legislation will reform how wildfire suppression is funded, in order to significantly minimize the harmful practice of transferring funds from critical programs to pay for wildfire suppression. The Wildfire Disaster Funding Act would fund response to the few most disastrous wildfires similar to how the Federal Emergency Management Agency (FEMA) funds other disaster response under the Balanced Budget and Emergency Deficit Control Act of 1985. This would put wildfire disasters on par, and without competing, with funding for response to other natural disasters such as floods, tornadoes, and hurricanes.

Wildfire seasons are getting longer and major wildfires are becoming increasingly more costly to suppress. This national problem is causing a crippling burden on the Department of the Interior and the USDA Forest Service's land management functions as they shift resources to fund suppression activities. Federal wildfire suppression will always be fully funded by the government – even if it comes at the expense of programs that improve forest health and mitigate future wildfires. However, this current *ad hoc* process of funding wildfire is inefficient and ineffective in delivering on nationwide agency land management priorities set by Congress and virtually assures that overall federal outlays will increase.

The Partner Caucus came together in 2009, representing a diverse set of international, national and local organizations interested in sustainable forest management on private, tribal, municipal, state and federal lands. We see a critical need to reform how suppression is funded, so other land management programs – many of which reduce long-term fire risk – are not impacted.

We urge Congress to adopt the solution offered by the Wildfire Disaster Funding Act. The new funding process it enables would place those wildfire disaster response activities commensurate with other natural disasters and provide federal agencies the tools and resources needed to successfully manage wildfires while investing in the health of forests and other lands. The Wildfire Disaster Funding Act is a critically important step to ensure the long-term health and sustainability of our nation's forests and other public lands.

Sincerely,

Partner Caucus on Fire Suppression Funding Solution

For information regarding this letter or members of the Partner Caucus on Fire Suppression Funding Solutions, please contact Cecilia Clavet, cclavet@tnc.org, 703-841-7425.

Signed by the following 261 organizations:

- | | |
|-----------------------------------|---------------------------------|
| 1. 3 LEGS COLLABORATION SERVICES | 3. ALLEGHENY HARDWOOD |
| 2. ALAMO NAVAJO SCHOOL BOARD, INC | UTILIZATION GROUP |
| | 4. ALLIANCE FOR COMMUNITY TREES |
| | 5. AMERICAN BIRD CONSERVANCY |

PARTNER CAUCUS on FIRE SUPPRESSION FUNDING SOLUTIONS

MAY 1, 2015

- | | |
|--|------------------------------------|
| 6. AMERICAN CANOE ASSOCIATION | 38. CALIFORNIA SKI INDUSTRY |
| 7. CANOE - KAYAK - SUP - RAFT - RESCUE | ASSOCIATION |
| 7. AMERICAN FARM BUREAU | 39. CALIFORNIA WATERFOWL |
| FEDERATION | 40. CANYON COUNTRY YOUTH CORPS |
| 8. AMERICAN FOREST & PAPER | 41. CATCH-A-DREAM FOUNDATION |
| ASSOCIATION | 42. CENTER FOR HEIRS' PROPERTY |
| 9. AMERICAN FOREST FOUNDATION | PRESERVATION |
| 10. AMERICAN FOREST RESOURCE | 43. CENTER FOR SUSTAINABLE |
| COUNCIL | COMMUNITIES |
| 11. AMERICAN FORESTS | 44. CENTRAL OREGON |
| 12. AMERICAN HIKING SOCIETY | INTERGOVERNMENTAL COUNCIL |
| 13. AMERICAN YOUTHWORKS | 45. CHOOSE OUTDOORS |
| 14. APPALACHIAN MOUNTAIN CLUB | 46. CITY OF ASHLAND, OR |
| 15. APPLGATE PARTNERSHIP AND | 47. CITY OF ASPEN, CO |
| WATERSHED COUNCIL | 48. CITY OF BEND, OR |
| 16. ARID LAND INNOVATION | 49. CITY OF DURANGO, CO |
| 17. ARIZONA CONSERVATION CORPS | 50. CITY OF KETCHUM, ID |
| 18. ARIZONA FIRE CHIEFS ASSOCIATION | 51. CIVIL WAR TRUST |
| 19. ARIZONA PRESCRIBED FIRE COUNCIL | 52. CLEAN WATER ACTION |
| 20. ARIZONA WILDLIFE FEDERATION | 53. CLEARWATER RESOURCE COUNCIL |
| 21. ASSOCIATION OF FISH AND WILDLIFE | 54. COLORADO TIMBER INDUSTRY |
| AGENCIES | ASSOCIATION |
| 22. ASSOCIATION OF NATIONAL | 55. CONGRESSIONAL SPORTSMEN'S |
| GRASSLANDS | FOUNDATION |
| 23. ASSOCIATION OF PARTNERS FOR | 56. CONSERVATION LEGACY |
| PUBLIC LANDS | 57. CONSERVATION NORTHWEST |
| 24. BACKCOUNTRY HUNTERS & ANGLERS | 58. CONSERVATIONCORPS, MN& IA |
| 25. BLACK HILLS FOREST RESOURCE | 59. CRILEY CONSULTING |
| ASSOCIATION | 60. DEFENDERS OF WILDLIFE |
| 26. BLACK HILLS REGIONAL MULTIPLE | 61. DUCKS UNLIMITED |
| USE COALITION | 62. EARTHJUSTICE |
| 27. BLACK HILLS RESOURCE, | 63. EASTERN ARIZONA COUNTIES |
| CONSERVATION, AND DEVELOPMENT | ORGANIZATION |
| 28. BLACK HILLS WOMEN IN TIMBER | 64. ECOSYSTEM WORKFORCE PROGRAM |
| 29. BLUE GOOSE ALLIANCE | 65. EL TESORO RETREAT CENTER |
| 30. BLUE MOUNTAINS FOREST PARTNERS | 66. ELLIOTSVILLE PLANTATION, INC |
| 31. BOULDER COUNTY, CO | 67. ENDANGERED SPECIES COALITION |
| 32. BRL SERVICES INC/BRL LOGGING | 68. ENVIRONMENT AMERICA |
| 33. BULL MOOSE SPORTSMEN'S ALLIANCE | 69. ENVIRONMENTAL AND ENERGY |
| 34. CALIFORNIA DEER ASSOCIATION | STUDY INSTITUTE |
| 35. CALIFORNIA FARM BUREAU | 70. ENVIRONMENTAL STEWARDS |
| FEDERATION | 71. ESTRADA COLLABORATIVE RESOURCE |
| 36. CALIFORNIA FIRE SAFE COUNCIL | MANAGEMENT, LLC |
| 37. CALIFORNIA FORESTRY ASSOCIATION | 72. FEDERAL FOREST RESOURCE |
| | COALITION |

PARTNER CAUCUS on FIRE SUPPRESSION FUNDING SOLUTIONS

MAY 1, 2015

- | | |
|---|---|
| 73. FIREFIGHTERS UNITED FOR SAFETY, ETHICS, AND ECOLOGY (FUSEE) | 108. INTERMOUNTAIN ROUNDWOOD ASSOCIATION |
| 74. FLAGSTAFF FIRE DEPARTMENT | 109. INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS |
| 75. FLATHEAD ECONOMIC POLICY CENTER | 110. INTERNATIONAL ASSOCIATION OF WILDLAND FIRE |
| 76. FLORIDA FORESTRY ASSOCIATION | 111. INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION |
| 77. FOOTHILL CONSERVANCY | 112. INTERTRIBAL TIMBER COUNCIL |
| 78. FOOTHILLS CONSERVANCY OF NORTH CAROLINA | 113. JARA LANDWORKS |
| 79. FOREST BUSINESS NETWORK | 114. KHII RADIO |
| 80. FOREST COUNTY ECONOMIC DEVELOPMENT PARTNERSHIP | 115. LAND TRUST FOR THE LITTLE TENNESSEE |
| 81. FOREST ENERGY CORPORATION | 116. LAKE COUNTY RESOURCES INITIATIVE |
| 82. FOREST GUILD | 117. LEMHI COUNTY |
| 83. FOREST HEALTH TASK FORCE | 118. LITTLE COLORADO RIVER PLATEAU RC&D |
| 84. FOUR FOREST RESTORATION INITIATIVE COLLABORATIVE STAKEHOLDER GROUP (4FRI) | 119. LOMAKATSI RESTORATION PROJECT |
| 85. FOURTH SECTOR STRATEGIES | 120. LOS PADRES FORESTWATCH |
| 86. FRAMING OUR COMMUNITY, INC. | 121. LOUISIANA FORESTRY ASSOCIATION |
| 87. FRIENDS OF THE COLUMBIA GORGE | 122. MAINE AUDUBON |
| 88. FRIENDS OF THE URBAN FOREST | 123. MAINLAND PLANNING, INC |
| 89. FRONT RANGE ROUNDTABLE | 124. MASS AUDUBON |
| 90. FUTURE FOREST, LLC | 125. MASSACHUSETTS ASSOCIATION OF CONSERVATION COMMISSIONS |
| 91. GILA TREE THINNERS | 126. MASSACHUSETTS LAND TRUST COALITION |
| 92. GILA WOODNET | 127. MASSACHUSETTS RESIDENT |
| 93. GLOBAL PARKS | 128. MASTERS OF FOXHOUNDS ASSOCIATION |
| 94. GRASSROOTS OUTDOOR ALLIANCE | 129. MCCUTCHANVILLE VOLUNTEER FIRE DEPT |
| 95. GREAT LAKES TIMBER PROFESSIONALS ASSOCIATION | 130. MID KLAMATH WATERSHED COUNCIL |
| 96. GREAT OLD BROADS FOR WILDERNESS | 131. MONTANA CONSERVATION CORPS |
| 97. GREATER FLAGSTAFF FORESTS PARTNERSHIP | 132. MONTANA WILDERNESS ASSOCIATION |
| 98. GREATER YELLOWSTONE COALITION | 133. MONTANA WOOD PRODUCTS ASSOCIATION |
| 99. HARDWOOD FEDERATION | 134. MOTTEK CONSULTING |
| 100. HAWKS ALOFT, INC | 135. MOUNTAIN STATES LUMBER AND BUILDING MATERIAL DEALERS ASSOCIATION |
| 101. IDAHO CONSERVATION LEAGUE | 136. MT ADAMS RESOURCE STEWARDS |
| 102. IDAHO FOREST GROUP | 137. MT TAYLOR MACHINE, LLC |
| 103. IDAHO FOREST OWNERS ASSOCIATION | 138. MULE DEER FOUNDATION |
| 104. IDAHO POWER COMPANY | |
| 105. ILLINOIS FIREFIGHTER ASSOCIATION | |
| 106. INDIANA FORESTRY & WOODLAND OWNERS ASSOCIATION | |
| 107. INTERMOUNTAIN FOREST ASSOCIATION | |

PARTNER CAUCUS on FIRE SUPPRESSION FUNDING SOLUTIONS

MAY 1, 2015

- | | |
|---|---|
| 139. NATIONAL ALLIANCE OF FOREST OWNERS | 167. NORTHWEST YOUTH CORPS |
| 140. NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS | 168. OHIO FORESTRY ASSOCIATION |
| 141. NATIONAL ASSOCIATION OF FOREST SERVICE RETIREES | 169. OUTDOOR ALLIANCE |
| 142. NATIONAL ASSOCIATION OF STATE FORESTERS | 170. OUTDOOR INDUSTRY ASSOCIATION |
| 143. NATIONAL ASSOCIATION OF UNIVERSITY FOREST RESOURCES PROGRAMS | 171. PARK CITY, UT |
| 144. NATIONAL CATTLEMEN'S BEEF ASSOCIATION | 172. PARTNERSHIP FOR RURAL AMERICA |
| 145. NATIONAL FEDERATION OF FEDERAL EMPLOYEES | 173. PARTNERSHIP FOR THE NATIONAL TRAILS SYSTEM |
| 146. NATIONAL FOREST HOMEOWNERS | 174. PHEASANTS FOREVER/QUAILS FOREVER |
| 147. NATIONAL NETWORK OF FOREST PRACTITIONERS | 175. PINCHOT INSTITUTE FOR CONSERVATION |
| 148. NATIONAL PARKS CONSERVATION ASSOCIATION | 176. POPE AND YOUNG CLUB |
| 149. NATIONAL RIFLE ASSOCIATION | 177. PUBLIC LANDS COUNCIL |
| 150. NATIONAL SKI AREAS ASSOCIATION | 178. PUBLIC LANDS FOUNDATION |
| 151. NATIONAL TRUST FOR HISTORIC PRESERVATION | 179. PUBLIC LANDS SERVICE COALITION |
| 152. NATIONAL VOLUNTEER FIRE COUNCIL | 180. QUAIL AND UPLAND WILDLIFE FEDERATION |
| 153. NATIONAL WILD TURKEY FEDERATION | 181. QUALITY DEER MANAGEMENT ASSOCIATION |
| 154. NATIONAL WILDFIRE INSTITUTE | 182. RECREATION EQUIPMENT INC (REI) |
| 155. NATIONAL WILDLIFE FEDERATION | 183. RENSSELAER PLATEAU ALLIANCE |
| 156. NATIONAL WILDLIFE REFUGE ASSOCIATION | 184. RESOURCE MANAGEMENT SERVICE, LLC |
| 157. NATIONAL WOODLAND OWNERS | 185. RESTORATION TECHNOLOGIES |
| 158. NEVADA CONSERVATION CORPS | 186. ROCKY MOUNTAIN ELK FOUNDATION |
| 159. NEW MEXICO FOREST INDUSTRY ASSOCIATION | 187. ROCKY MOUNTAIN TREE-RING RESEARCH |
| 160. NEW MEXICO PRESCRIBED FIRE COUNCIL | 188. ROCKY MOUNTAIN YOUTH CORPS |
| 161. NEW MEXICO STATE LAND OFFICE | 189. RUFFED GROUSE SOCIETY |
| 162. NORTHBROOK PUBLIC WORKS | 190. RURAL COUNTY REPRESENTATIVES OF CALIFORNIA |
| 163. NORTHERN ARIZONA WOOD PRODUCTS ASSOCIATION | 191. SAFARI CLUB INTERNATIONAL |
| 164. NORTHERN FOREST CENTER | 192. SALMON VALLEY STEWARDSHIP |
| 165. NORTHWEST CONNECTIONS | 193. SAN JUAN FOREST HEALTH PARTNERSHIP |
| 166. NORTHWEST FOREST WORKER CENTER | 194. SAN JUAN WOODY-INVASIVES INITIATIVE |
| | 195. SCOTT VALLEY COALITION OF FIRE SAFE COUNCILS |
| | 196. SIERRA CLUB |
| | 197. SIERRA FOREST LEGACY |
| | 198. SIUSLAW INSTITUTE |
| | 199. SOCIETY OF AMERICAN FORESTERS |

PARTNER CAUCUS on FIRE SUPPRESSION FUNDING SOLUTIONS

MAY 1, 2015

- | | |
|---|---|
| 200. SOUTH CAROLINA FORESTRY ASSOCIATION | 229. THE WILDLIFE SOCIETY |
| 201. SOUTH CAROLINA WILDLIFE FEDERATION | 230. THEODORE ROOSEVELT CONSERVATION PARTNERSHIP |
| 202. SOUTH CENTRAL WASHINGTON RESOURCE CONSERVATION AND DEVELOPMENT COUNCIL | 231. TIERRA Y MONTES SWCD |
| 203. SOUTH DAKOTA ATV/UTV ASSOCIATION | 232. TOWN OF LAONA, FOREST COUNTY, WI |
| 204. SOUTH DAKOTA CAMPGROUND OWNERS ASSOCIATION | 233. TOWN OF VAIL, CO |
| 205. SOUTH DAKOTA FAMILY FORESTS | 234. TREAD LIGHTLY! |
| 206. SOUTHEAST YOUTH CORPS | 235. TREE MUSKETEERS |
| 207. SOUTHERN ENVIRONMENTAL LAW CENTER | 236. TRIBAL ENVIRONMENTAL POLICY CENTER |
| 208. SOUTHERN OREGON CLIMATE ACTION NOW | 237. TROUT UNLIMITED |
| 209. SOUTHERN OREGON FOREST RESTORATION COLLABORATIVE | 238. TWIN WILLOWS RANCH |
| 210. SOUTHERN OREGON TIMBER INDUSTRIES ASSOCIATION | 239. UPSTATE FOREVER |
| 211. SOUTHERN UTAH WILDERNESS ALLIANCE | 240. UTE MOUNTAINEER |
| 212. SOUTHWEST CONSERVATION CORPS | 241. VAIL RESORTS |
| 213. SOUTHWEST FORESTS SUSTAINABLE PARTNERSHIP | 242. VERMONT WOODLANDS ASSOCIATION |
| 214. SPATIAL INTEREST, LLC | 243. VILLAGE RECONSTRUCTION AND DEVELOPMENT PROJECT |
| 215. SPEARFISH (SD) LIVESTOCK ASSOCIATION | 244. VIRGINIA FOREST PRODUCTS ASSOCIATION |
| 216. SUSTAINABLE NORTHWEST | 245. VIRGINIA FORESTRY ASSOCIATION |
| 217. SWAN ECOSYSTEM CENTER | 246. WALLOWA RESOURCES |
| 218. TAHOE REGIONAL PLANNING AGENCY | 247. WASHINGTON STATE FIRE FIGHTERS' ASSOCIATION |
| 219. TAOS COUNTY ECONOMIC DEVELOPMENT CORPORATION | 248. WASHINGTON WILDLIFE AND RECREATION COALITION |
| 220. TELLER COUNTY HOME BUILDERS ASSOCIATION | 249. WATERSHED RESEARCH & TRAINING CENTER |
| 221. TEXAS FORESTRY ASSOCIATION | 250. WEST RANGE RECLAMATION, LLC |
| 222. THE CONSERVATION FUND | 251. WESTERN ENVIRONMENTAL LAW CENTER |
| 223. THE CORPS NETWORK | 252. WILD SOUTH |
| 224. THE GEORGIA CONSERVANCY | 253. WILDEARTH GUARDIANS |
| 225. THE NATIONAL ASSOCIATION OF RV PARKS AND CAMPGROUNDS | 254. WILDLIFE FOREVER |
| 226. THE NATURE CONSERVANCY | 255. WINTER WILDLANDS ALLIANCE |
| 227. THE TRUST FOR PUBLIC LAND | 256. WISCONSIN OFF-ROAD VEHICLE PARK, INC |
| 228. THE WILDERNESS SOCIETY | 257. WISCONSIN WOODLAND OWNERS ASSOCIATION INC |
| | 258. WYOMING MINING ASSOCIATION |
| | 259. WYOMING STOCK GROWERS ASSOCIATION |
| | 260. YORK LAND TRUST |
| | 261. ZUNI MOUNTAIN FOREST COLLABORATIVE |



**Statement for the Record by the
Placer County Water Agency, Auburn, California**

**Submitted to the Senate Committee on Energy and Natural Resources
Hearing on Federal Government's Role in Wildfire Management
May 5, 2015**

About PCWA

Placer County Water Agency owns and operates the Middle Fork American River Project, providing water supplies, hydroelectric power, public recreational opportunities and environmental stewardship for the people of Placer County and the region. The people of Placer County built the Middle Fork Project in the 1960s to develop local water resources for the long-term public benefit. Placer County Water Agency was created to ensure, and remains committed to supporting, diligent management of those water resources.

California Water

PCWA is one of some 50 water and energy utilities that operate in the Sierra Nevada mountain range, which provides approximately 65% of California's water supply on an annual basis. Simply stated, California's mountain headwaters and the rain and snow that falls in these watersheds make it possible to supply clean drinking water to 38 million Californians and the homes, farms and businesses that support a \$1.6 trillion dollar annual economy.

Why Federal Land Policy Matters in California

Approximately 45% of California is owned and managed by the federal government, and well over 75% of our headwaters are managed by the US. Bureau of Land Management or the U.S. Forest Service. This means that while local agencies own and operate water and hydroelectric systems through-out these headwaters, the land from which our water and energy supplies are derived are managed by policies that are not locally derived and which often have far-reaching economic and societal impacts throughout the state.

Our Recent Experiences

PCWA is located in the Middle Fork American River watershed, about 2 hours east of Sacramento, California. Our watershed spans some 412 square miles, and provides enough drinking water for 250,000 citizens and enough renewable hydroelectric energy for 100,000 homes. 36% our watershed, some 150 square miles – has burned since 2000. While some of these fires have been mild in nature, others have been increasingly devastating because of the intensity and severity with which they engulf the landscape.

This troubling trend, fueled by decades of active fire suppression and changes in forest management policy and exacerbated by natural drought conditions, has led to a situation that puts California's water supplies at great risk, and leaves local agencies like mine bearing the consequences.

King Fire

Our experience with the King Fire in 2014 offers a good example. The King Fire was ignited on the afternoon of September 13, 2014 in El Dorado County. For the first 4 days, the fire burned in a mix of privately managed timberlands and the El Dorado National Forest, growing to approximately 20,000 acres by the morning of Wednesday, September 17, and spreading at a moderate rate. Wednesday afternoon brought extremely low humidity and increased wind speed, which drove the fire into the remote and densely forested Rubicon River canyon, an important tributary to the American River. Once it reached the Rubicon canyon, the fire exploded.

In the next 12 hours, the fire grew by almost 50,000 acres, making a run of almost 16 miles overnight. Fire officials on the ground used words like "unprecedented" and "unheard of" to describe the speed and intensity at which this fire destroyed the landscape. A rare mid-September rain storm and a calming of wind conditions were the only two factors that halted this fire from continuing its advance into the Lake Tahoe watershed and even more devastating consequences.

The King Fire ravaged the Rubicon River watershed with high-severity incineration. Complete loss of vegetative cover has exposed soils to erosion on thousands of acres of steep, sloping river canyons. Sediment and debris derived from this erosion threaten the integrity and function of hundreds of millions of dollars of water and power infrastructure, as well as miles of aquatic and riparian habitat vital to frog and fish species of concern to state and federal regulatory agencies.

All told, the King Fire burned 153 square miles in three watershed and two counties. More than 60% of the fire burned at high intensity. The costs were tremendous, and are ongoing:

\$118,500,000 in direct firefighting costs was borne by the public;

\$8,000,000 in immediate costs to repair and protect water and energy infrastructure was borne by local utilities like mine;

Untold costs to roads, cultural resources, and wildlife habitat, and soil resources;

Ongoing costs to local utilities that must now deal with the aftermath.

The Aftermath

The effects of large catastrophic wildfire on natural and man-made infrastructure lasts for decades, and the effects on the forest itself can last for centuries. In the case of water and hydroelectric utilities that operate in California's watersheds, the aftermath is often worse than the event itself.

Wildfires in the Sierra tend to occur at the worst possible time of year, at the end of summer. Not only are forest fuels at their driest, but the transition from the arid California summer to the wet fall can happen quickly and with devastating results. Particularly in the case of high-intensity fire, trees whose root systems once held steep slopes in place are now dead. Soils that were once a rich and stable organic ecosystem that was resistant to erosion are now baked into a loose cake which has a tendency to reject water from rain events and then all at once become a muddy slurry that tumbles off of canyon walls and into rivers and streams. As the receivers of mud, rock and dead trees, our river systems become overwhelmed with this debris and transport it downstream during high flow events.

Once this debris enters lakes and reservoirs, it fills in valuable storage space, blocks spillways and ruins equipment and generating machinery. PCWA has experienced this before. The Star Fire that burned in 2001 is still depositing large dead trees and tons of sediment into our facilities some 14 years later. We, like many other utilities in the Sierra, must regularly, and at great cost to our ratepayers, clean our reservoirs of sediment, rock and trees or they would become useless mud flats.

In the case of the King Fire, the U.S. Forest Service estimates that over 300,000 of tons of topsoil are poised to erode into Rubicon River from King Fire burned area the first year after the fire. Ralston Powerhouse and Afterbay Dam are located a short distance below 19 miles of scorched Rubicon River canyon and when this reservoir fills up, hydropower production and water flow for our citizens is stopped for months at a time. This stretch of river has also been identified by PCWA in collaboration with regulatory agencies as important habitat for frog and fish species of concern, habitat which will be severely impacted by fire-induced sedimentation.

This impact can last for many years. While trees and brush can begin to regrow within a decade of even an intense fire, the fertile soils that have taken millennia to establish are damaged for many centuries. This long after-effect means that our facilities are ultimately less valuable, our water dirtier, and our ability to serve a growing California economy water and energy products diminished for many decades.

Destined for Disaster?

Recent scientific findings point to an increase in the frequency and intensity of large wildfires in the West. While there are many potential causes, we believe that at least part of the problem lies with a century of wildfire suppression and a recent reduction in active timber management on public lands. It is clear in our watershed that fuel loads, particularly small trees and brush, have increased to an extent that where a person could once walk through a forest of large, mature trees, one now finds impenetrable brush fields and thousands of small, unhealthy trees. Under natural conditions, the Sierra landscape would have seen much more frequent and lower intensity fires which would have cleaned the forest of these fuel loads and left the forest healthier for it.

In our view, because of decades of increasing fuel loads, it is not currently possible to return to this natural fire pattern without great risk to valuable human infrastructure.

However, we believe that using a combination of techniques that include active mechanical harvesting of smaller fuels, logging of appropriate larger trees, controlled burning, and replanting, land managers can return the system to a much healthier equilibrium that brings the forest into balance without the risk that untrammelled natural burning would incur. Implemented appropriately, these programs have the potential to be financially self-sustaining, while benefitting the economies of rural communities in our watersheds.

Returning to a balanced approach to forest management will take time and focus. In California, much of the forest product infrastructure that existed in our rural communities in the past has been consolidated into centrally located mills that have limited capacity, and often cannot process smaller logs. If we can begin to rebuild our forest management capacity, we believe there will be opportunities to rebuild sustainable forest product infrastructure in our rural communities in the form of biomass energy, fuel wood and fuel pellet, and milled lumber products. Working within the construct of a public and private partnership, the health of our rural communities and the health of our watersheds can be sustained in perpetuity.

Water and hydropower utilities throughout the West have come together with private landowners and local governments to begin the conversation of returning our forests to a more sustainable condition. We believe that by applying the following principles to our publicly owned forest and rangelands, we can achieve a balanced result that will benefit our water supplies, our recreational opportunities, ecosystem health, and help to restore communities that rely on natural resources to power their economies.

Policy Principles:

- Current laws and regulations must be improved to reflect the urgency of reducing fire risk in Western forests and to recognize that catastrophic wildfire is the greatest risk to forest ecosystems and species, and to the water quality and water supplies that originate from our headwaters.
- Forest management tools as such forest thinning, biomass management and controlled burns that reduce fuel loading, and consequently, the risk of catastrophic wildfires should be accelerated to the extent feasible. Federal laws and regulations that slow or limit such efforts should be reassessed to enable broad and active utilization of these management tools.
- Best available science should be continually applied to forest management. New developments in landscape management techniques that benefit water quality and water yield should be integrated as pilot and demonstration projects in the ongoing management of federal lands.
- It is imperative that the Congress provide adequate and stable funding to the Department of the Interior and the Department of Agriculture to support sustained development and implementation of programs that improve the condition, trend and resiliency of federally managed headwaters. Stability in funding necessitates that the fighting of large, catastrophic fires be funded from emergency management funds rather than borrowed from regular agency operating budgets.
- For catastrophic wildfire mitigation projects intended to reduce the likelihood and severity of wildfire, National Environmental Protection Act (NEPA) and Endangered

Species Act (ESA) compliance should weigh the long-term impacts to species and ecosystems of catastrophic wildfire when analyzing any short-term impacts of pre-fire mitigation actions.

- For post-fire forest restoration actions, time is of the essence to protect the natural and man-made infrastructure of our watersheds. National Environmental Protection Act (NEPA) and Endangered Species Act (ESA) compliance should be greatly streamlined and weigh the overall long-term health of the landscape against any short-term impacts of mitigation actions.
- Litigation is often the cause of lengthy delays in pre-fire mitigation and post-fire forest restoration projects. Given the risks and impacts of a catastrophic wildfire, a higher standard should be required to stop or delay projects in high-risk watersheds. Congress should act to limit the scope, standing and timelines associated with the filing of suits that delay action on federal lands.
- Federal law and agency policies should allow local stakeholders to partner with the federal land managers to pursue opportunities to conduct the planning and implementation of fuels reduction and restoration projects on federal lands.

Summary and Conclusion

Land management in the West is at an important crossroad, and requires bold actions by Congress and compromise on the part of many stakeholders. As water and hydropower utilities that serve a growing population and are tenants and stewards of federal lands, we have a vested interest in the success of headwaters management. The science of forest management has advanced greatly, and to put it simply, federal, state and local land managers now know how to manage our forests better to achieve multiple ecosystem and societal needs in a balanced way. However, we require flexibility in federal law and federal agency rules and regulations to test, experiment and ultimately apply the best available science to forest management for the benefit of all. We hope that as Congress takes up the issue of federal land management, you call upon us to help define the parameters of a successful future so that the next generation of Americans will continue to enjoy our forest and rangelands.

Contact Information:

Mr. Andrew Fecko
 Director of Resource Development
 Placer County Water Agency
 144 Ferguson Road, P.O. Box 6570, Auburn, CA 95604
 530-823-4850



Attachment - Photographs/Maps – King Fire

**Statement for the Record by the
Placer County Water Agency, Auburn, California**

**Submitted to the Senate Committee on Energy and Natural
Resources**

Hearing on Federal Government's role in Wildfire Management

May 5, 2015



